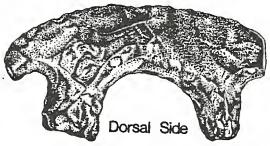
BUREAU OF LAND MANAGEMENT

California
Desert
District

ECCENTRIC CRESCENTIC
from Kane Spring NE Quadrangle
Imperial County, Ca. 1979



A Summarization of an Archaeological Sample of the Glamis/Dunes Area, Imperial Valley, California

Bureau of Land Management
Library
Bldg. 50, Denver Federal Center
Denver, CO 80225

cultural resources publications
archaeology - history

#9797150

E
78
.C15
B931

A SUMMARIZATION OF AN ARCHAEOLOGICAL SAMPLE OF THE GLAMIS/DUNES AREA, IMPERIAL VALLEY, CALIFORNIA

Prepared for

BUREAU OF LAND MANAGEMENT
1695 SPRUCE STREET
RIVERSIDE, CALIFORNIA 92507

Prepared by

CHARLES S. BULL
SUPERVISING ARCHAEOLOGIST

RECON
Regional Environmental Consultants
1094 Cudahy Place Suite 204 San Diego, CA 92110 275-3732

JOB NUMBER R-1254
JUNE 9, 1981

BUREAU OF LAND MANAGEMENT LIBRARY
Denver, Colorado
88000201

TABLE OF CONTENTS

		Page
ABSTRACT		1
I.	INTRODUCTION	2
	A. PROJECT DESCRIPTION	2
	B. SETTING AND LOCATION	4
	C. PAST RESEARCH	9
	D. SUMMARY OF AREA USE	14
II.	PROJECT DESIGN AND RESULTS	16
	A. PURPOSE AND SAMPLING DESIGN	16
	B. METHODS	21
	C. RESULTS	22
	1. Prehistoric Sites	22
	2. Isolated Finds	28
	3. Military Historic Resources	30
	4. Nonmilitary Historic Resources	30
	5. Record Searches	30
	D. DISCUSSION	37
III.	MANAGEMENT CONCERNS	42
	A. NATIONAL REGISTER	42
	B. IMPACTS AND MITIGATION	45
IV.	PROJECT PARTICIPANTS	47
V.	REFERENCES CITED	48

ATTACHMENTS

Attachment 1: Cultural Sequence for the Imperial County Area
Attachment 2: Report for Glamis/Sand Hills Ethnographic Study
Attachment 3: Forms
Attachment 4: Definitions
Attachment 5: Site Listing by Type
Attachment 6: Pork Jerkey Crescentic.....Russell L. Kaldenberg
Attachment 7: Supplement....Laverne Conway, Glenda Foster, Maureen Steiner

TABLE OF CONTENTS
(continued)

Page

FIGURES

Figure 1:	Project location relative to Imperial County	3
Figure 2:	Geologic structure of study area	5
Figure 3:	Location of Glamis and Dunes study zones	15
Figure 4:	Relative position of sample transects	16
Figure 5:	Location of cultural resources	24

TABLES

Table 1:	Plant Communities	8
Table 2:	Status of Sample Transects	20
Table 3:	Prehistoric Sites	23
Table 4:	Isolated Items	29
Table 5:	Military Sites	31
Table 6:	Nonmilitary Sites	32
Table 7:	Sites Previously Recorded in or Near the Lease Area	34
Table 8:	Chi-Square Analysis of Prehistoric Resources	38
Table 9:	Probability Samples Results	39
Table 10:	Projected Site Totals, Glamis/Dunes Study Area	41

ABSTRACT

In compliance with the National Historic Preservation Act, as amended, and the National Environmental Policy Act, a sample survey was conducted by the Bureau of Land Management (BLM) for the competitive and noncompetitive leases for geothermal exploration/development for the Glamis/Dunes area of Imperial County, California. This investigation involved the selection and survey of a series of one- by one-quarter-mile transects along the eastern edge of the Salton Trough by a team of archaeologists representing the BLM.

As a result of this survey, 182 cultural resources were found. Forty-five of these were military resources, 68 were prehistoric, and 69 were nonmilitary historic resources.

The following report discusses the nature and results of the survey and concerns for the management of these resources. The report is presented in accordance with the requirements for a Class II survey provided in BLM manual section 8111.

I. INTRODUCTION

A. PROJECT DESCRIPTION

The proposed project involves the leasing of federal land under the jurisdiction of the BLM for the development of geothermal resources. The area involved includes 41 noncompetitive lease applications and 2 known geothermal resource areas (KGRA).

BLM has received applications for release of public lands for exploration and possible development of geothermal resources anticipated in the Glamis and Dunes areas of eastern Imperial County. The anticipated nature of the project and associated impacts are described in the development model presented in the draft environmental assessment prepared by BLM.

The location of the area under consideration is illustrated in Figure 1. The general study area encompasses about 194,000 acres, 160 of which are privately held, 7,897 held by the state of California, and the remainder placed under federal jurisdiction. The federal lands consist of 104,329 held by the Water Power Resources Service (WPRS) and 82,131 acres under the control of BLM (Bureau of Land Management 1981:3).

The Federal Geothermal Leasing Program is authorized by the Geothermal Steam Act of 1970, in accordance with regulations contained in 43 CFR 3200 and 30 CFR 270 and 271. The policy of the Department of the Interior is summarized as follows:

> It is the policy of this department to encourage the development of the mineral resources under its jurisdiction where mining is authorized. However, the public interest requires that . . . adequate measures be taken to avoid, minimize, or correct damage to the environment . . . (36 CFR 23.1 1979)

In light of this policy, impacts on cultural resources within the areas under consideration for leasing were addressed. A sample survey of the lease areas was conducted to assess potential impacts on cultural resources, and provide a foundation for the evaluation and recommendation for mitigation of those impacts.

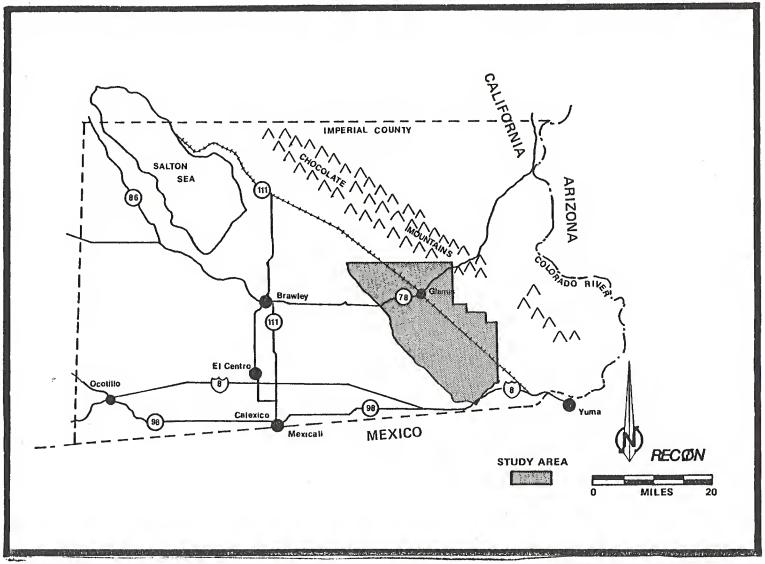


Figure 1. This map shows the Glamis/Dunes study area within Imperial County, California.

B. SETTING AND LOCATION

The proposed geothermal lease area lies in the eastern portion of Imperial County, California. It ranges in elevation from 100 to 500 feet above Mean Sea Level (MSL). It is situated along the eastern edge of the Salton Trough and consists of a gently sloping bajada.

The study area is underlain by sedimentary rocks overlain by recent alluviums. The geological structure of the general study area is presented in Figure 2.

Of particular interest to the cultural resources of the area is the large lake which once covered much of the Salton basin. This lake, variably called Lake LeConte, Lake Cahuilla, and the Blake Sea, was intermittently filled with freshwater. Von Werlhof (1979:18) argues that lacustrine resources associated with this lake were the primary attraction for the occupation of the east mesa area.

Filling of the lake bed is determined by changes in the course of the Colorado River (Aschmann 1959:44-45; Weide 1976:12; Wilke 1978:33; O'Connell 1971:178; Morton 1977:19). When the river flows south across its delta, it empties directly into the Gulf of California. River sediments deposited in the delta periodically become sufficiently high enough that the flow of water into the gulf is obstructed by this natural dam across the trough. The river then discharges to the north, emptying into the Salton basin and forming a substantial body of water. The structure of the delta indicates this sequence has occurred many times (Weide 2976:11; Aschmann 1959:45). There have thus been alternating periods of lacustrine and desert conditions in the Salton basin.

It has been estimated that these diversions of the Colorado River into the Salton basin resulted in a lake about 34 miles wide, 115 miles long, and over 300 feet deep (Wilke 1978:33). Between intervals of high lake stands, it is probable many fluctuations in lake level occurred. Following Weide's (1976) methodology, Wilke determined dessication of the lake via evaporation when inflow to the basin ceased would occur within 50 to 60 years. As dessication progressed, increasing salinity occurred. The complex lacustrine biotic environment could then no longer be supported, and the lake reverted to a dry, playa sink with reestablishment of arid desert species.

The history of this ancient lake is intimately related to the prehistoric occupation of the Colorado Desert.

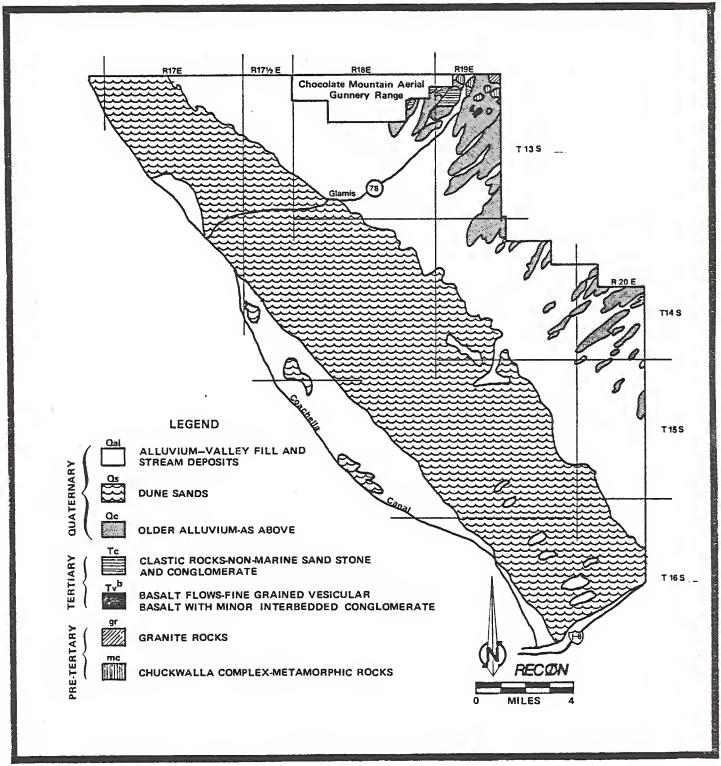


Figure 2. This figure shows the general geologic structure of the study area (after BLM 1981).

Past studies by various researchers (Stanley 1962; Wilke 1978; Weide 1976; Thomas 1963; Childers 1977) have contributed to our knowledge of the various lake stands and their temporal placement. However, little conclusive data is available in print (Weide 1976:17). Most recently, Michael R. Waters (1979:27-34) has undertaken a detailed study of the lake as the topic for a masters thesis in geology from the University of Arizona, Tucson. The majority of the information incorporated herein is derived from an abbreviated version of his research made available in a recent cultural resource study of the east mesa and west mesa areas.

Waters reports that six high stands of Lake LeConte are presently known to have occurred during the late Pleistocene. These range in elevation from the highest stand of 170 feet above MSL to subsequent stands at 150, 130, 125, 120, and 100 feet. Although a considerable number of radiocarbon dates have been obtained in attempts to date these stands, only the 150- and 100-foot levels are considered accurately dated (Waters 1979:29; Weide 1976:17). A minimum age of 37,000±2000 B.P. is felt to be valid for the 150-foot contour lake level, dated by two closely correlating samples. The 100-foot stand has been dated at a minimum age of 26,000±1570 to 1325 B.P. Childers (1977:19) has reported high lake stands at 440 and 420 feet MSL; however, further information will be necessary to document a lake at this level.

High lake stands of the Holocene period are related to the 40-foot elevation. Wilke (1978:57) proposed three periods of lake filling during the last 2000 years: 100 B.C. to 600 A.D., 900 to 1250 A.D., and 1300 to 1500 A.D. Waters (1979:30) is of the opinion that at least seven lacustral intervals maintaining this 40-foot shoreline occurred during the late Holocene. Radiocarbon dates to clarify the chronology are pending (Waters 1979:30).

During periods of basin filling, the lake was not only a source of potable water for prehistoric populations, but the carrying capacity of the area was greatly increased by the abundant associated floral and faunal resources. With high lake stands, the surrounding water table would have been increased. More water, so critical in the desert environment, would have been available in streams, seeps, and springs. In addition, the economically important land-based vegetation would have thrived and been more productive.

The biotic setting of the present study area is characterized primarily by creosote bush scrub, desert microphyll woodland, desert riparian woodland, and desert dune sand plant communities. The distribution is presented in the

draft environmental assessment prepared by BLM. A list of typical plants associated with these communities is provided in Table 1. A variety of references are available summarizing the ethnobotanical use of these plants (Bean 1972; Bean and Saubel 1972; Barrows 1967; Brooks et al. 1977). It is sufficient at this time to recognize the potential availability of both floral and faunal resources for local area occupants and have a general understanding of their distribution.

An area of Sand Hills crosses the study area from northwest to southeast. Because this area is not subject to potential lease it was not considered as part of the cultural resource assessment. The result of omitting this portion of the general study area of the universe examined during the present program is essentially two elements that differ in several significant ways.

The southwestern portion of the study area, the Dunes zone, is primarily creosote bush scrub, while a mixed desert microphyll woodland/creosote bush scrub community dominates the northeastern aspect, the Glamis zone. The zones also vary in elevation and distance from extinct Lake Cahuilla. The elevation for the Glamis/Dunes area ranges from 115 to 520 feet above MSL. The situation and orientation of the study area along the eastern edge of the Salton Trough and the corresponding division used here provides definition of presently natural strata. This will play an important role in the ultimate analysis of the present investigation.

TABLE 1
PLANT COMMUNITIES

Scientific Name	Common Name
Creosote Bush Scrub	
Ambrosia dumosa	Burro-Weed
Atriplex ssp.	Saltbush
Echinocereus ssp.	Hedgehog Cactus
Encelia farinosa	Brittle-Bush
Eriogonum inflatum	Desert Trumpet
Feracactus acanthodes	Barrel Cactus
Fouquieria splendens	Ocotillo
Larrea divaricata tridentata	Creosote
Opuntia cylindropuntia ssp.	Cholla
Desert Dune Sand Plant	
Ambrosia dumosa	Burro-Weed
Atriplex ssp.	Saltbush
Coldenia plicata	Desert Mat
Ephedra trifurca	Mormon Tea
Eriogonum deserticola	Dune Buckwheat
Larrea divaricata tridentata	Creosote
Desert Microphyll Woodland	
Acacia greggii	Catclaw
Cercidium floridum	Palo Verde
Chilopsis linearis	Willow
Dalea spinosa	Smoke Tree
Hyptis emoryi	Desert lavender
Larrea divaricata tridentata	Creosote
Olneya testota	Ironwood
Prosopis glandulosa var. torreyana	Mesquite
Prosopis pubescens	Screwbean
Desert Riparian Woodland	
Arundo donax	
Baccharis ssp.	
Chilopsis linearis	Willow
Phragmites australis	Common Reed
Pluchea sericea	Arrowweed
Populus fremontii	Cottonwood
Prosopis glandulosa var. torreyana	Mesquite
Tamarix pentandra	Tamarisk
Typhia ssp.	Cattail

C. PAST RESEARCH

Numerous cultural resource surveys have been conducted in the East Mesa area. Two East Mesa sites identified by Maxon (1975) were subsequently further studied by Brooks et al. (1977). Both sites are located along the Lake Cahuilla shoreline considerably north of this present project. One lies northwest of State Highway 78 and the other is east of Calipatria. Both sites contained lithic artifacts and potsherds. Ten pottery types were identified at one site, and twelve were reported at the other (Brooks et al. 1977:13 and 18). In addition, the site near Highway 78 had midden deposit containing charcoal, fishbone, and shell. Two radiocarbon dates obtained on charcoal at this site produced dates of 1600 and 1625 A.D. (Brooks et al. 1977:54). With the presence of numerous pottery types, it was suggested these site areas had been repeatedly reoccupied by different late prehistoric groups.

A sizeable portion of East Mesa along the ancient shoreline, as well as higher sloping lands east of the shoreline mesa bluff, was surveyed by Ellis and Crabtree (1974). Cultural resources were interpreted as temporary camps, processing/manufacturing areas, trails, and ceremonial areas, all related to short-term late prehistoric exploitation of lake shore and marsh resources and, secondarily, land-based resources (Ellis and Crabtree 1974:63-66 and 74). Sites were located primarily on one of three topographic areas: 1) directly on the ancient beachline, 2) on partially stabilized sand dunes once associated with sloughs and on sand ridges east of the beach barrier ridge, and 3) on sand fields on the surface of East Mesa (Ellis and Crabtree 1974:21). They concluded that the dune and slough topography and the areas of sheet dunes would provide more evidence of aboriginal activity than would the shoreline area (Ellis and Crabtree 1974:99).

Assessment of the cultural resources of East Mesa by Ritter (1975) differed somewhat from the findings of Ellis and Crabtree. Ritter's evaluation was based on the results of a field reconnaissance combined with information developed from previous investigations of the area (Ritter 1975:1-2). He concluded that the Lake Cahuilla shoreline also contained considerable evidence of prehistoric activity and that cultural resources may also exist along the eastern edge of East Mesa.

> . . . my own observations of camps along the shoreline suggest that in places substantial activity took place and important cultural resources exist here as well.

> Thus, it appears that both the shoreline areas and the stabilized dunes and ridges east of the main lacustrine beach barrier ridge received the greatest focus of aboriginal activity. As one proceeds east of this area, the site density drops off considerably. My assessments, however inadequate, suggest that the interior of East Mesa contains no more than about one site per square mile. Known sites represent small pottery scatters and cobble concentrations. A greater density of sites may be present near the eastern margin of East Mesa where it adjoins the Sand Hills. However, the shifting of sands may have obscured an undetermined number of sites (Ritter 1975:3).

A number of studies have been conducted in the East Mesa area prior to geothermal testing (von Werlhof and von Werlhof 1975, 1978; von Werlhof, von Werlhof, and Pritchett 1977a, 1977b).

The most comprehensive discussion of the prehistory of the East Mesa region has been presented by von Werlhof et al. (1979) in conjunction with an archaeological report on the Magma site.

According to von Werlhof, there has been a tendency in the past to assess the archaeological resources of East Mesa as representing seasonal exploitation of this area by Riverine bands (1979:17). Von Werlhof argues that lacustrine resources associated with Lake Cahuilla were the singular attraction drawing Yumans of the lower Colorado River Valley to the East Mesa area (1979:17). East Mesa served as a seasonal and temporary living area. Lacustrine resources, including fish, shellfish, migratory birds, and small game, were exploited. Secondary limited foraging and hunting in lands adjacent to the lake was probably practiced. Von Werlhof summarizes this seasonal exploitation as follows:

> The riverine Yumans seasonally visited the East Mesa shore to fish, dig for fresh water clams, hunt small game and migratory birds, and gather from a limited range of wild vegetation. Midden deposits are scarce and house sites have so far been undiscovered, attesting to the short-term visits of these people. The lake environment itself could not have provided year round subsistence at any but the most meager level, and even then for only a few persons. The large number of campsites and their densities of surface-evidence indicated that many bands utilized the lakeshore, with probably two or more family

groups comprising a band. The lack of tool variety, food processing wares, religious or ornamental objects, all lead to the conclusion, too, that the lakeshore was infrequently and only seasonally visited (von Werlhof et al. 1979:30).

Von Werlhof suggests that Yuman I and II artifacts relate to subsistence practices associated with Lake Cahuilla, whereas the Yuman III material relates to trade and travel between the Colorado River and the peninsular range after dessication of the lake (1979:16-17).

The East Mesa area offers very little suitable raw lithic material; thus, tool manufacture was dependent upon either importation of quartzite, chert, and chalcedony from the Colorado River basin or the use of inferior lithic materials (von Werlhof et al. 1979:31). Importation of tools was practiced to a small degree. Lithic sites indicate that more often these prehistoric people preferred to make do with inferior materials rather than to transport. The lithic industry is primarily composed of unsophisticated tools of minimal efficiency level. The assemblage reflects only basic work needs and consists primarily of knives and scraping tools. A decline of the basic Yuman lithic tradition while at the lake has been suggested (von Werlhof et al. 1979:35).

The Magma site study project consisted of an intensive cultural resources investigation including surface collections and test excavations. Ten prehistoric resources were located. Contour elevation and site distribution showed that these sites arced around a shallow sink which once contained a pond or embayment which filled during high stands of Lake Cahuilla (von Werlhof et al. 1979:59). Seven of these sites were major temporary camps containing or surrounded by specialized activity loci (von Werlhof et al. 1979:104). The remaining three sites included an isolated tool, pottery, and lithic scatters.

The sites were characterized by "small and crude flake knives and scrapers, abraders or rubbing stones, punctates (pics, burins, perforators, awls, or drills), small hammerstones, imported choppers or axes, and an occasional fragmented mano" (von Werlhof et al. 1979:35-36). All ten resources were indicative of short-term use areas for the exploitation of lacustrine resources and limited foraging and hunting of small animals in the adjacent desert lands. Although carbon 14 dates from three different sites produced no dates earlier than the Yuman II period, the analysis of recovered pottery indicated utilization of Lake Cahuilla in the last 2,000 years during all three periods postulated for

periods of high lake stands: 100 B.C. to 600 A.D., 900 to 1250 A.D., and 1300 to 1500 A.D. (von Werlhof et al. 1979:33-34).

One site, 4-IMP-318, included a fish camp. Excavation at this site recovered five species of fish, as well as molluscan species (von Werlhof et al. 1979:42-47). A second site, 4-Imp-3442, incorporated a fishing hole. Several sites showed evidence of brush burning in preparation for the camp site.

The tool kit at the Magma site consisted mostly of knives and scrapers and reflected the unsophisticated technology observed at other East Mesa locals.

A summation of the Magma site is as follows:

> In sum, the site types observed at Magma were essentially temporary camps that contained and were surrounded by specalized loci of activities. These all point to the conclusion that the Yumans did not transplant their riverine culture to the lacustrine environment, but made do with the resources available. They imported or traded in but a few items that could not easily be manufactured at the shore. They did not carry on religious, and probably did not carry on social, rituals in an organized form. They doubtlessly were here for a week or a few weeks during which time the flooding waters of the Colorado inundated the riverine valleys and filled the Salton Sink. In Yuman I time (500-1000 A.D.) the riverine people began horticultural experiments in the receding waters of the floodplain (Hicks 1976), and probably sought out the lake for fresh water fish at a time when their unundated valleys could be neither lived in, planted in, nor fished in (von Werlhoff et al. 1979:104).

Four alternative areas in East Mesa, Imperial Valley, and the Yuma Valley have been surveyed for the U.S. Department of the Interior, Bureau of Reclamation (Eckhardt 1979). The study consisted of an intensive survey of 6,813 acres compiling alternative areas 1 through 3 and a 20 percent sample of an additional 8,179 acres in alternative area 4. The project resulted in the identification of 95 cultural resources. A broad diversity of site types is represented with sites consisting of temporary camps, lithic scatters, pottery scatters, trail segments, a cremation locus, intaglios, rock alignments, historic elements, and isolated artifacts. All prehistoric resources are essentially

contemporaneous and, on the basis of artifact types and ceramics, attributed to the Late Prehistoric period (Eckhardt 1979:106).

Sites along the relict shoreline of Lake Cahuilla were generally the most complex and extensive. Numerous extractive food processing-type tools were found in this shoreline region. Eckhardt concluded that in the absence of lithic resources and areas suitable for shelter, it would appear that lacustrine resources were the primary factor attracting prehistoric peoples to this area (1979:100). Sites across the breadth of East Mesa revealed a more limited range and quantity of artifact types. Over 90 percent of the ceramics in the study area dated from 1000 to 1500 A.D. (Eckhardt 1979:100). The six ceramic types noted in the area do, however, span the period from 500 to 1900 A.D., implying extensive trade and travel from the Colordo River to Lake Cahuilla (Eckhardt 1979:101). Trail segments, oriented east-west, appeared to substantiate this.

Historic sites recorded consisted of trash dumps, isolated artifacts, and work camp sites associated with construction of canals or maintenance stations.

A sample-oriented cultural resource inventory of 45,120 acres of East Mesa, north of the Holtville outlying airfield, was conducted for the Bureau of Land Management (Gallegos 1979). Stage 1 of this project consisted of a systematic sample without stratification. The field survey covered 4,480 acres, or 10 percent of the sampling universe (Gallegos 1971:83). fifty-one cultural resources were located as a result of the stage 1 survey. Two of these were historical sites. The 49 prehistoric site consisted of 19 temporary camps, 1 lithic scatter, 17 pottery loci, and 12 isolated finds (Gallegos 1979:83-85). Of these sites, 78.3 percent were located within one-quarter mile of the 40-foot shoreline of Lake Cahuilla, or the "skinney bar." Over 50 percent of the temporary camps were directly on the shoreline (Gallegos 1979:85).

Stage 2 of the sampling procedure was structured around the 40-foot shoreline (Gallegos 1979:87). An additional 2,240 acres were surveyed in this stratum. As a result, 37 cultural resources were located consisting of 16 temporary camps, 3 lithic scatters, 8 pottery loci, and 10 isolated finds. Excluding isolates, over 50 percent of the sites were temporary camps (Gallegos 1979:89).

D. SUMMARY OF AREA USE

1. Prehistory. At the present time, there are four major cultural stages proposed for the Colorado Desert: Early Man, Paleo-Indian, Milling Stone, and Late Prehistoric. Within each of these, various patterns and phases have been proposed. The Early Man stage includes the Malpais and Pinto Wash patterns and is presented as a late Pleistocene occupation for the area. The Paleo-Indian stage is proffered as following the Early Man patterns and is represented by the San Dieguito pattern. The milling horizon marks the onset of the Milling Stone stage, which is dated from approximately 7,000 years before the present (B.P.). This stage is continued until the advent of Cottonwood and Desert Side-Notched projectile points and ceramics.

The arguments for the stages, patterns, and phases proposed for the Colorado Desert are numerous. They are discussed in detail in Attachment 1 of this report.

2. Ethnography. The Glamis/Dunes study area has not been used by Native Americans for many years. The ethnographic record, however, can provide information concerning the more recent aboriginal occupations of this and similar desert areas. Potential occupants/users of the area are all Hokan speakers and include the Diegueno, Cocopa, and Quechan languages.

Review of ethnographic literature and interviews conducted with representatives of the above referenced groups indicated that the area in question was primarily used as an access corridor. The basis for this conclusion, as well as a detailed ethnographic description, is provided in Attachment 2.

3. History. The historic development of the Imperial Valley is tied inexorably to water. Earliest historic development (approximately 1849) is referenced in association with available water at Camp Salvation, better known as Calexico (Smith 1978). Subsequent area visitation was also water focused. In the 1850s, surveys were completed on the navigability of the Colorado River. The river served as the principle means of transportation to and from Fort Yuma. Steamer traffic could be found on the river from 1857 to 1879, until it was ultimately replaced by the railroad (Farr 1918). The Southern Pacific Railroad was constructed in 1879. The only other significant transportation element was a brief service by the Butterfield Stage. This stage visited the area twice a month enroute from San Francisco to St. Louis. Interestingly, the stage route was cancelled when the

federal government lifted its subsidy because of pressures resulting from the Civil War.

Major use of the Imperial Valley region did not begin until the development of the canal system bringing Colorado River water to large areas of the desert. This project was originally the dream of Wozencroft, but he failed to see it to completion. The impetus for the development ultimately came from Rockwood, who proposed preliminary designs and obtained certain necessary federal permits. The turn of the century saw the first Colorado River water flow into what, in 1907, was to become Imperial County. In fact, in 1905, a mud dam broke, and for over a year, the Colorado River itself flowed into the Salton Basin.

Military history in the area began in earnest with General Patton's selection of the area for a World War II training facility. The entire training area covered over 20,000 square miles of Imperial and San Bernardino counties. The base camp site was situated ". . . slightly over twenty miles by automobile east of Indio" (Meller 1940:3). Three other sites were selected for camps. These lay in the vicinity of Desert Center, the Inyo Mountains, and Needles. The main camp was established in March and April of 1942.

The Glamis/Dunes project area lies at the western edge of the training area, approximately 18 miles (28.5km) south of Desert Center. The abundance of military cultural resources in the Glamis zone of the sample described below is testimony to the use of the area for training purposes.

II. PROJECT DESIGN AND RESULTS

A. PURPOSE AND SAMPLING DESIGN

1. Purpose. The purpose of the present study is to provide a valid and reliable assessment of the cultural resources within the area of potential geothermal leasing and from that assessment to address potential significant impacts to those resources.

To accomplish this purpose, an equivalent Class II survey was completed of the general study area. This survey involved the completion of a probabilistic sample of that portion of the geothermal leasing area not within the Sand Hills portion of the study zone.

2. Sample Design. The area to be sampled consists of two main units: the Glamis area and the Dunes area. These zones are the result of omitting from the sample that area within the Sand Hills which is not subject to potential lease. The resulting boundaries of the study zones are illustrated in Figure 3.

The area was arbitrarily divided into one-quarter- by one-mile segments, corresponding to the cadastral grid system. This resulted in the establishment of 412 potential sample units.

A modified aligned systematic sample was selected from this population. A random number, from one to four, determined the placement of the initial sample unit within the first and second tiers of the population (a tier being a series of sections running from east to west). The selection was done without replacement to insure that the units selected did not occur in the same relative place within a section. This resulted in the second possible sample unit being surveyed in the odd numbered tiers and the fourth unit being chosen in the even numbered tiers. The lcoation of each unit selected is provided in Figure 4.

Some of the selected units fell partially outside of the sampling universe. Those portions of the selected unit within the universe were surveyed, those portions outside were not. Since the statistical design for the project requires that only those units which were completely within the study area be included in the analysis, only those units which were totally within the sample universe were included in the probability aspect of the project. In this way, high degrees of validity and reliability can be maintained, yet maximum amounts of information are made available for

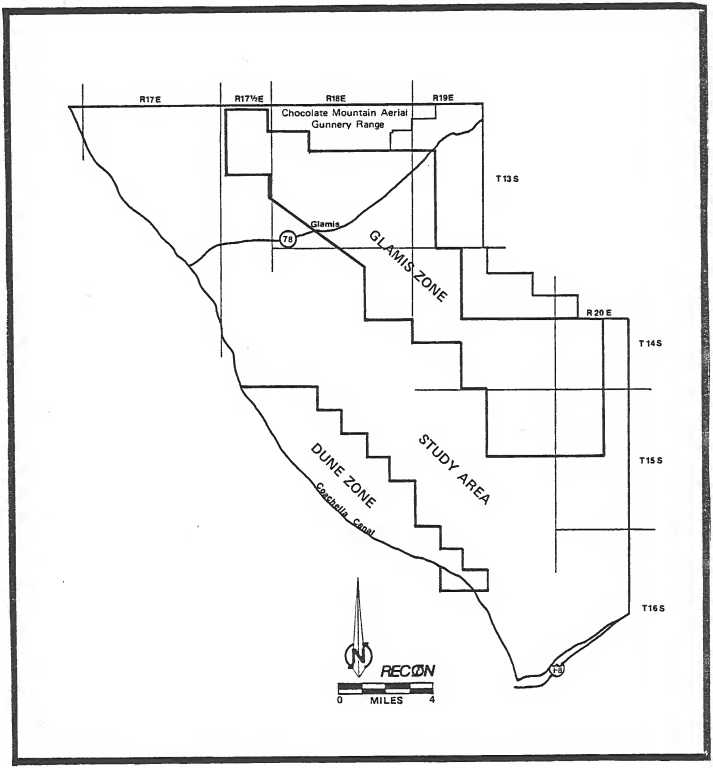


Figure 3. This map shows the position of the Glamis and Dunes study zones.

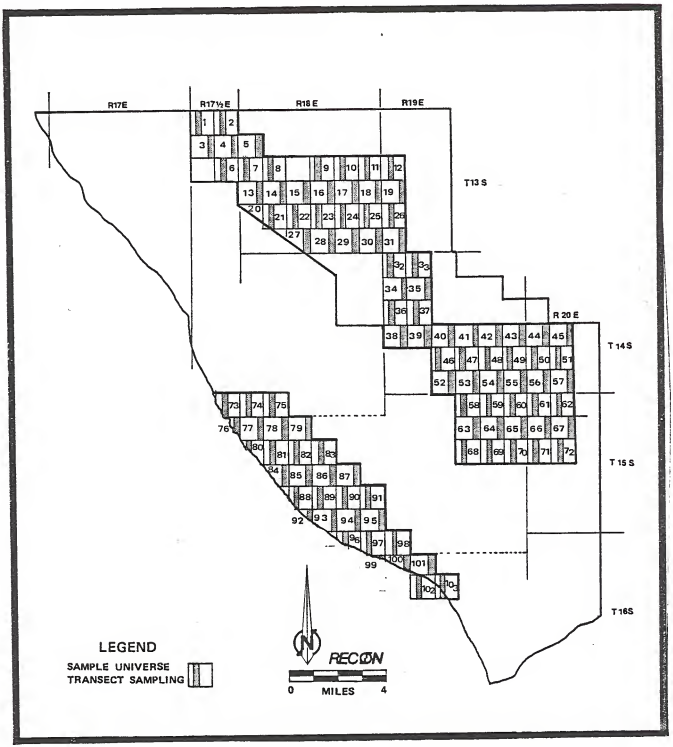


Figure 4. This map shows the relative position of sample transects.

planning purposes. This will become clearer in the analytic discussion presented below.

As a result of the sampling program, 103 transects were selected. Seventy-two of these units fell within the Glamis study zone and 31 within the Dunes zone. Since sampling procedures were consistent between these strata, final discussion can combine the results, as well as address potential stratification.

During the processing of information resulting from the survey, field notes for transect number 10 were misplaced. Because of this, specific information concerning the nature of the survey of that transect and the cultural materials within it is unavailable. For the present discussion, this unit will be omitted.

Of the 103 transects, 21 fell either partially or completely outside the sample universe. Eighty-two transects, therefore, were included in the probabilistic sample. Transect assignment is provided in Table 2.

TABLE 2
STATUS OF SAMPLE TRANSECTS

Samples Completely Within the Universe					Samples Partially Within the Universe	Omitted Samples
1	21	40	59	86	20	10
2	22	41	60	89	73	27
3	23	42	61	90	75	58
4	24	43	62	92	76	63
5	25	44	64	93	78	68
6	26	45	65	94	79	69
7	28	46	66	95	83	87
8	29	47	67	96	88	
9	30	48	70	97	91	
11	31	49	71	98	99	
12	32	50	72	102	100	
13	33	51	74		101	
14	34	52	77		103	
15	35	53	80			
16	36	54	81			
17	37	55	82			
18	38	56	84			
19	39	57	85			

B. METHODS

The survey of each transect was conducted on-foot with four persons spaced approximately 50 meters apart. This required two sweeps (north-south) for each sampled transect. Cultural resource, environmental, and other pertinent data were collected for each transect and recorded on BLM sample unit forms (Attachment 3). Classification and recording of encountered resources were guided by the BLM site classification system. Standard BLM site forms were used to record survey results.

Collection of cultural materials was minimized. Only those items considered diagnostic were collected. All recovered material was catalogued. Limited collections of natural and cultural materials which could not be identified in the field were made. No subsurface testing was completed.

When a site was found, the field team would jointly determine the site area and collect information concerning the nature of the resource. Transect forms were completed upon completion of each transect.

The criteria used to determine when a site form was completed conformed to BLM definitions for distinguishing sites and isolates. Threshold criteria of more than five items within a twenty-five square meter area was used for this definition. Other site definitions corresponded to standard BLM procedures. Definitions for site types employed are presented in Attachment 4.

C. RESULTS

Cultural resources found during the present survey fall into three general resource categories: prehistoric resources, historic resources, and recent land use evidence. Prehistoric resources include sites and isolates left by the aboriginal occupants of the area. Historic resources are those remains resulting from past Euro-American land use with a reasonable claim to antiquity, while recent land use evidence involves trash and features of relatively recent times. The distinction between historic resources and recent activity is relatively arbitrary but is necessary to insure cost-effective management of valuable resources.

A total of 183 cultural resources were found during the present investigation. One hundred and fourteen of these were historic and sixty-nine were prehistoric in origin. Of the 114 historic resources, 45 can be attributed to the military use and occupation of the area. The other historic sites range from a graveyard to recent historic trash. The majority of the prehistoric resources were isolated finds. Thirty-eight of the sixty-eight resources in this catagory were isolated, leaving only thirty-one other prehistoric sites. These ranged from ceramic and lithic scatters to temporary camps. An inventory of the resources found on the present survey is provided in Attachment 5.

1. Prehistoric Sites. Thirty-one prehistoric archaeological sites were found during the present survey. These are summarized by type in Table 3. The sites range in size from less than one square meter to more than 9,000 square meters. While there is no specific evidence of midden at any of the archaeological sites found, the potential for a subsurface deposit exists at four sites: T77-1, T82-1, T83-1, and T86-1. It should be emphasized that no subsurface testing was conducted and that these observations are made soley of surface evidence. The locations for both the prehistoric sites and isolates are provided in Figure 5.

a. T12-1: This site consists of a single small ring of rocks. It is located in an area of sand and gravel disturbance and covers an area of approximately 0.45 square meters. It forms an oval measuring 90 centimeters by 50 centimeters.

No artifacts were found in direct association with this stone circle, but an isolated flake was found in the backdirt of the sand and gravel operation in the immediate vicinity. There is no indication of a subsurface component to this resource.

TABLE 3
PREHISTORIC SITES

Zone	Transect Number	Site Number	Site Type	Description	Elevation (feet)	Size (m^2)
Glamis	12	1	2	Sleeping circle/rock ring	620	0.45
Glamis	33	4	2	9 sleeping circles with lithics	480	27
Glamis	60	1	2	Hamlets (circa 1939)	390	
Glamis	62	2	2	Sleeping circle with sherd	470	175
Dunes	83	1	2	2 potsherds, flakes	N.R.*	144
Dunes	86	1	2	Campsite (aboriginal)	133	9,000
Dunes	93	1	2	2 potsherds, flakes	N.R.	N.R.
Dunes	95	1	2	Fossil bone, lithics	150	25
Dunes	95	4	2	3 potsherds, chert core	150	N.R.
Glamis	15	1	5	Lithic scatter	395	1
Dunes	98	4	5	Flakes, hammerstone	135	25
Glamis	22	3	7	Potsherd scatter	340	6
Glamis	40	2	7	Potsherd scatter/hearth	438	560
Glamis	44	1	7	Potsherd scatter	532	5
Glamis	66	1	7	Potsherd scatter	431	4
Dunes	75	1	7	Potsherd scatter	130	1
Dunes	76	1	7	Potsherd scatter	N.R.	1
Dunes	77	1	7	Potsherd scatter	120	1
Dunes	82	1	7	Potsherd scatter with chert	125	1,800
Dunes	86	2	7	Potsherd scatter	N.R.	100
Dunes	90	1	7	Potsherd scatter	133	4
Dunes	91	1	7	Potsherd scatter	N.R.	N.R.
Dunes	91	2	7	Potsherd scatter	N.R.	8
Dunes	95	2	7	Potsherd scatter	150	N.R.
Dunes	98	3	7	Potsherd scatter	135	81
Dunes	100	1	7	Potsherd scatter	140	14
Dunes	103	1	7	Potsherd scatter, cobble core	145	490
Glamis	12	2	14	Aboriginal trail with sherds	620	<1,000
Glamis	24	2	18	Sleeping circle	420	6
Glamis	26	4	18	Sleeping circles	N.R.	N.R.
Glamis	34	6	18	2 sleeping circles	N.R.	N.R.
Glamis	62	1	18	3 circular areas	N.R.	24

*N.R. = not recorded

FIGURE 5 IS IN POCKET AT THE END OF THIS REPORT

b. T12-2: This site is an aboriginal trail with associated artifacts. The trail runs roughly northeast-southwest, approximately paralleling the Glamis/Blythe Road.

There are numerous ceramic scatters in association with this site. Concentrations occur within three to four meters of the edge of the trail. Flaked lithic tools were also found near the trail.

In addition to the prehistoric materials associated with this site, several deflated pits, possibly the remains of foxholes, were found in the area. Both the trail and the foxholes are interrupted by washes and past vehicle travel.

c. T15-1. This is a small lithic scatter covering less than ten square meters. The site consists of cores and flakes produced from a brown chert. There has been some off road vehicle (ORV) disturbance in the area. There is no indication of a subsurface component.

d. T22-3. This site is characterized by a scatter of Tizon Brown Ware over an area of between 11 and 50 square meters. There is no indication of a subsurface aspect to the site, which includes about 44 sherds. There are several rim sherds, and some of the pieces show paddle and scraping marks. There has been some impact from ORV and erosion, but the site is generally in good condition.

e. T24-2. This site is a small area partially cleared of rocks with a small central depression. There were no artifacts found in association with this feature, but the field crew felt that the site may be a prehistoric resource.

The circle measures approximately three meters in diameter, with the minor central depression covering about ten square meters.

f. T33-4. This large site consists of nine sleeping circles within an area of 60 square meters. The circles range in size from 2.4 meters in diameter to 3.0 meters. They lie on two sides of an intermittant wash on alluvial soils.

There is no indication of a subsurface deposit at this site. A single chert scraper and a brown chert flake were found in association with one of the circles. These are the only artifacts found at this site.

g. T40-2. Covering less than 250 square meters, this site consists of a scatter of ceramics and lithic artifacts and a hearth. It is possible that the feature and the artifacts are associated, but no confirming evidence was found. The hearth covered an area of 42 by 32 centimeters, was not outlined by rocks, and had wood and charcoal. While the hearth appeared to be recent, the wood remains were broken and not cut. There is no reason to believe that any subsurface materials exist at this site.

h. T44-1. This is a small scatter of ceramics in an area less than ten square meters. Approximately 25 sherds were scattered on a developed desert pavement. The scatter is adjacent to an ORV trail, but is in good condition. Materials are limited to the surface.

i. T62-2. No site form.

j. T62-1. No site form.

k. T66-1. No site form.

l. T75-1. This is a very small sherd scatter about one meter in diameter. Fragements of weathered bone can be found in the area, but association is undetermined. There are only six sherds at the site, and there is no subsurface deposit.

m. T76-1. Similar to T75-1, this site consists of a very small scatter of potsherds. There are about eight sherds, which range in color from brown/red to grey. It is possible that several of the fragments could fit together to form one large segment of a vessel. The entire scatter occurs within a one-meter-diameter circle. Cultural material appears confined to the surface.

n. T77-1. Even smaller than T76-1 and T75-1, this site covers an area of 0.38 square meters. About 13 sherds occur within this area. These sherds are light brown to grey in color and show indication of brush or paddle marks. The site is in fair condition, with some ORV activity evidenced in the area.

o. T82-1. This is a large site covering over 5,000 square meters. The site is characterized by a ceramic and lithic artifact scatter in various associations over the site area.

The site has more than 100 potsherds and a chert flake in one area of concentration. As with most of

the cultural resources in the survey area, the soil of this site appears primarily alluvial. While there is no apparent midden, the variety and concentration of materials indicates the potential, while not probability, for a subsurface component.

p. T83-1. This small site is less than 50 square meters in size. It consists of a small scatter of flaked lithic artifacts and ceramics. The assemblage at the site consisted of only three flakes and two potsherds.

q. T86-1/2. This site consists of approximately 80 potsherds in a 10-meter-diameter area. A related scatter of +20 sherds in a similar area was found to the south. While the site covers an area of more than 5,000 square meters, it should be noted that much of this area does not have artifacts. The actual size of the site is determined by the extent of the sherd scatters. In addition to the ceramics, a scree of lithic waste was also found.

As with T82-1, the soil of this site is alluvial in nature. The quantity and distribution of artifacts suggests the remote possibility that there is a subsurface component to this site.

r. T90-1. This site consists solely of five ceramic fragments in a two-meter-diameter area. There is no indication of depth and no other associated artifacts. The site lies on the definitional border of an isolated find. The sherds appear sufficiently similar to have come from the same vessel.

s. T91-2. This "pot drop" consists of about seven sherds in an area less than ten square meters. The site is surface only and there are no other artifacts in association. Of note is that three of the potsherds were rim fragments and that well-weathered bone can be found in the area. No direct association can be drawn between the bone and ceramics with present evidence.

t. T93-1. No site form.

u. T95-1/2/3/4. A cursory inspection of this area revealed two concentrations of weathred bone, a light ceramic scatter, and several pieces of lithic detritus. Both ceramic and lithic materials occur in concentrations along and near the base of the dunes. There is no indication of a subsurface component, although there may be some buried artifacts.

v. T98-3. This site consists of two sherd scatters, flaked lithic material, shell, and bone. The westernmost sherd scatter consists of four sherds within a one-meter area. The second scatter consists of about 25 sherds within a 10-meter-diameter area.

The second scatter was found in association with an Argopecten sp. shell fragment. These shells are found in great abundance on coastal sites but only rarely in this desert setting.

One lithic tool was found in direct association with this scatter. The majority of the lithic artifacts were found approximately 90 meters north of this larger scatter. Here, three flakes, a possible hammerstone, and several bird bones were found.

w. T100-1. This is a concentrated ceramic scatter. Twenty sherds lie in an area of less than fifty square meters, with three large pieces within less than one-half meter of each other. These large sherds can be joined from about two-thirds of the original olla. No other artifacts were found in association with this scatter, and there is no indication of depth.

x. T103-1. A scatter of lithic and ceramic artifacts over an area of about 7,000 square meters consititutes this site. The surface materials included several rim sherds, two chalcedony flakes, and a possible core fragment. The site is in fair condition despite ORV impacts in the general vicinity.

2. Isolated Finds. The majority of the prehistoric material found during the present investigation was isolated finds. These, as defined above, consist of less than 5 artifacts within an area of 25 square meters.

Thirty-eight isolated finds were made during the Glamis/Dunes survey. A brief description of these resources is provided in Table 4. Three items not included in this table deserve special note. T12-1, T34-4, and T34-7 are all recorded as sites, either historic or prehistoric. An isolated artifact was found in association with each. While the field crew identified these three items as isolated occurrences, they were combined with the sites with which they were associated.

TABLE 4
ISOLATED ITEMS

Zone	Transect Number	Site Number	Site Type	Description	Elevation (feet)	Size (m^2)
Glamis	1	1	16	Potsherd	310	N.A.*
Glamis	12	3	16	Chert flake	630	N.A.
Glamis	12	4	16	Chalcedony flake	630	N.A.
Glamis	14	1	16	Chert hammerstone	630	N.A.
Glamis	30	5	16	Chert tool	385	N.A.
Glamis	32	1	16	Potsherd	450	N.A.
Glamis	37	7	16	Chalcedony core	N.R.†	N.A.
Glamis	38	1	16	Chert flake	360	N.A.
Glamis	39	2	16	Jasper flake	400	N.A.
Glamis	39	6	16	Chert fragment	400	N.A.
Glamis	39	5	16	Potsherd	400	N.A.
Glamis	40	1	16	Flake (possible)	438	N.A.
Glamis	40	3	16	Chalcedony core	438	N.A.
Glamis	42	1	16	Chalcedony flake	460	N.A.
Glamis	43	1	16	Potsherd	515	N.A.
Glamis	47	6	16	Chalcedony tool	380	N.A.
Glamis	54	1	16	Chert tool (possible)	410	N.A.
Glamis	57	6	16	Chert flake	500	N.A.
Glamis	61	4	16	Chert flake	455	N.A.
Glamis	61	3	16	Chert flake	455	N.A.
Glamis	64	1	16	Potsherd	460	N.A.
Glamis	66	5	16	Jasper multi-use tool	415	N.A.
Dunes	75	2	16	Fossil bone	N.R.	N.A.
Dunes	78	1	16	Quartzite flake	120	N.A.
Dunes	84	1	16	Hammerstone	125	N.A.
Dunes	89	1	16	Chert flake	130	N.A.
Dunes	89	2	16	Potsherd	132	12
Dunes	91	3	16	Potsherd, flake	150	N.A.
Dunes	93	2	16	Hammerstone (possible)	135	N.A.
Dunes	94	1	16	Potsherd	137	N.A.
Dunes	95	3	16	Chert flake	145	N.A.
Dunes	98	2	16	Potsherd	135	N.A.
Dunes	98	1	16	Hammerstone	135	N.A.
Dunes	101	1	16	Large mammal bone	150	N.A.
Dunes	101	2	16	Cobble concentration	150	N.A.
Dunes	102	1	16	Chert core tool	145	N.A.
Dunes	103	2	16	Potsherd and stone chopper	147	N.A.

*N.A. = not available

†N.R. = not recorded

Examination of the isolate table shows that the difference between sites and isolates for the present project is one of size more than of kind. Isolates seem to reflect the same general land use patterns as the sites. Sherds, flakes, and an occasional bone fragment or rare tool constitute the isolate assemblage.

3. Military Historic Resources. Forty-five resources found during the present investigations can be attributed to the military occupation and use of the area. These resources include remnants of foxholes, runways, trash dumps, tent clearings, and major emplacements. The resources are inventoried in Table 5.

The majority of these resources are small, ill-defined evidence of the substantial military use of the desert for World War II training.

4. Non-Military Historic Resources. Sixty-nine historic sites could not be assigned to military origins. The great majority of these remaining resources are relatively recent. Many cannot be assigned to a particular group or time period because of their indistinct nature. All sites which fall into this general category are listed in Table 6. The majority of these resources are isolated historic finds. This single category was the most well represented of all recorded site types. Several deserve special mention, however.

a. T28-1. This site is an old graveyard. It consists of at least 12 graves and is fenced. The site is deteriorated, and there is evidence of ORVs throughout the area. The estimated time period for this resource is 1879, which would make it one of the earliest historic resources in the Imperial Valley area.

b. T60-1. This site is recorded as "Hamlets @1939," but there is no remaining site record or extensive description. It lies at an elevation of approximately 350 feet above MSL. An effort is presently being made to reconstruct the field information for this resource.

5. Record Searches. In addition to the cultural resources found during the present investigation, record checks at the Imperial Valley College Museum indicated 91 sites in or near the lease area. These are exclusively prehistoric resources and range from isolated tools to trails and sleeping circles. These sites are presented by type in Table 7.

TABLE 5
MILITARY SITES

Zone	Transect Number	Site Number	Site Type	Description	Elevation (feet)	Size (m^2)
Glamis	1	2	13	Hearth/circular depression	300	
Glamis	7	1	13	Foxhole/boot sole	300	
Glamis	8	1	13	Foxhole/ammunition sheets	370	
Glamis	9	1	13	Military camp	470	5,000
Glamis	11	1	13	Bomb craters	595	
Glamis	17	1	13	Hearth with cans	480	
Glamis	18	4	13	Campfire (foxhole?)	540	
Glamis	19	5	13	Rock alignment	570	
Glamis	19	1	13	Foxhole with cans	570	
Glamis	19	2	13	Large campsite	580	
Glamis	19	4	13	Concentration of cans	570	
Glamis	19	3	13	Foxhole with cans	590	
Glamis	22	2	13	Runway	345	
Glamis	24	1	13	Foxhole with cans	420	
Glamis	26	5	13	Foxholes	490	
Glamis	30	4	13	U-shaped crater	390	
Glamis	30	1	13	Tent clearings	415	
Glamis	31	1	13	Cleared rectangles	485	
Glamis	31	2	13	Hearth, cleared squares	510	
Glamis	33	2	13	Foxhole with cans	480	
Glamis	33	3	13	Semicleared areas	460	
Glamis	34	1	13	Military camp (?)	395	
Glamis	34	9	13	Campfires	405	
Glamis	34	7	13	Tent rectangle		
Glamis	34	8	13	Historic dump	415	
Glamis	39	7	13	U.S. Army buttons	400	
Glamis	39	8	13	Foxholes (?)	400	
Glamis	40	4	13	Foxhole	420	
Glamis	42	2	13	Foxholes	460	
Glamis	45	1	13	Military camp	560	
Glamis	47	3	13	Foxhole	400	
Glamis	47	4	13	Army emplacement	405	N.R.*
Glamis	48	5	13	Military camp	420	
Glamis	51	5	13	Sleeping squares	500	
Glamis	51	3	13	Military camp	523	
Glamis	51	1	13	2 hearths with cans	540	
Glamis	51	7	13	Hearth with cans	505	
Glamis	51	6	13	5 foxholes	510	8.75
Glamis	54	4	13	Military camp (probable)	410	
Glamis	57	1	13	Hearth, foxhole	500	
Glamis	57	3	13	Charcoal hearth with metal	530	
Glamis	57	5	13	Camping activity	500	
Glamis	57	2	13	Hearth, foxhole	500	
Glamis	61	6	13	Sleeping area	430	
Glamis	61	5	13	Foxhole	450	

*N.R. = not recorded

TABLE 6
NONMILITARY SITES

Zone	Transect Number	Site Number	Site Type	Description	Elevation (feet)	Size (m^2)
				Miscellaneous Resources		
Glamis	2	2	34	Circular depression	350	
Glamis	2	3	34	Military camp	320	40 m*
Glamis	2	1	34	Hearth	335	
Glamis	16	1	34	Hearth/modern	442	
Glamis	17	2	34	Furrows	N.A.†	
Glamis	18	1	34	Campfire	520	
Glamis	18	3	34	Campfire	545	
Glamis	18	5	34	Campfire	515	
Glamis	23	4	34	Hearth	375	
Glamis	23	1	34	Hearth	365	
Glamis	23	2	34	Hearth	368	
Glamis	23	3	34	Hearth	370	
Glamis	23	5	34	Hearth	362	
Glamis	25	3	34	U-shaped furrow	415	1
Glamis	25	1	34	Hearth	485	
Glamis	25	2	34	Hearth	478	
Glamis	26	8	34	Furrows	615	
Glamis	26	1	34	Hearth with cans	530	
Glamis	26	6	34	Names spelled in quartz	510	
Glamis	26	3	34	Hearth (rock ring)	500	
Glamis	26	2	34	Hearth with glass	510	
Glamis	26	7	34	Hearth	510	
Glamis	30	6	34	Small depression	410	
Glamis	30	2	34	Circular depression	425	
Glamis	30	3	34	Hearth	405	
Glamis	31	3	34	Campfire cave with glass	505	
Glamis	33	1	34	Depression	490	
Glamis	34	2	34	Charcoal concentration	410	
Glamis	34	4	34	Horseshoe	425	
Glamis	34	5	34	Charcoal concentration	430	
Glamis	34	3	34	Charcoal concentration	420	
Glamis	39	3	34	Charcoal hearth	400	
Glamis	39	1	34	Telephone poles	380	
Glamis	39	4	34	Hearth with cans	400	
Glamis	41	2	34	Charcoal concentration	450	
Glamis	42	3	34	Hearth with cans	460	
Glamis	46	1	34	Trail (aboriginal/ORV?)	380	
Glamis	46	2	34	Telegraph poles	385	N.A.
Glamis	47	1	34	1940 nickle	400	
Glamis	47	2	34	Hearth	400	
Glamis	47	5	34	Hearth with cans	390	

TABLE 6
NONMILITARY SITES
(continued)

Zone	Transect Number	Site Number	Site Type	Description	Elevation (feet)	Size (m^2)
				Miscellaneous Resources (cont.)		
Glamis	48	2	34	Rock alignment	410	<10
Glamis	48	3	34	Charcoal hearth	420	
Glamis	48	4	34	Charcoal hearth	420	
Glamis	48	1	34	Hearth	435	
Glamis	50	2	34	Hearth with cans	500	
Glamis	50	1	34	Scattered charcoal	485	
Glamis	51	2	34	Charcoal hearth	525	1
Glamis	51	4	34	Campfire	518	
Glamis	54	3	34	Hearth with cans	435	
Glamis	54	6	34	Charcoal hearth	420	
Glamis	54	5	34	Axe-cut ironwood tree	420	
Glamis	54	2	34	Axe-cut ironwood tree	410	
Glamis	57	4	34	Charcoal hearth	530	
Glamis	58	1	34	Charcoal hearth	360	
Glamis	61	2	34	Charcoal hearth	455	
Glamis	61	1	34	Depression	425	
Glamis	62	3	34	Sign (arrow shaped)	480	
Glamis	65	1	34	Metal shovel blade	400	
Glamis	66	4	34	Charcoal hearth	415	
Glamis	66	3	34	Charcoal hearth	465	
Glamis	66	2	34	Charcoal hearth	470	
				Graves		
Glamis	28	1	30	Chinese graveyard (1878)	335	
				Roads		
Glamis	67	1	26	Wagon tracks (possible)	450	
				Dumps		
Glamis	11	2	31	Historic dump	595	
Glamis	18	2	31	Dumps with cans	540	5 m*
Glamis	32	2	31	Scattered cans	420	
Glamis	41	1	31	Can scatter with bottles	430	
Glamis	56	1	31	Can dump	420	

*This is linear meters, not square meters.

†N.A. = not available

TABLE 7
SITES PREVIOUSLY RECORDED
IN OR NEAR THE LEASE AREA

Site Number	Brief Description	Site Type	Township	Range	Section
Imp-1156	Rock ring	18	13S	18E	12
Imp-1157	Lithic workshop	5	13S	18E	12
Imp-1158	Rock ring	18	13S	18E	12
Imp-1159	2 rock rings, lithics	2	13S	19E	6
Imp-1160	Lithics, sleeping circles	2	13S	19E	6
Imp-1815	Lithic workshop	5	13S	18E	*
Imp-1816	Lithic workshop	5	13S	18E	
Imp-1817	Fist axe	16	13S	18E	
Imp-1818	Lithic scatter	5	13S	18E	
Imp-1819	Lithic shop	5	13S	18E	
Imp-1820	Lithic scatter	5	13S	18E	
Imp-1821	Sleeping circles, lithics	2	13S	18E	
Imp-1822	Sleeping circles, lithic	2	13S	18E	
Imp-1878	Isolate tool	16	13S	19E	
Imp-1879	Sleeping circle	18	13S	19E	
Imp-1880	Sleeping circles	18	13S	19E	
Imp-1881	Trail	14	13S	19E	
Imp-1966	Trail	14	13S	19E	
Imp-1967	Hammerstone, scrapes	16	13S	19E	
Imp-1968	Fist axe	16	13S	19E	
Imp-1969	Pottery scatter	7	13S	19E	
Imp-1970	Trail, fist axe	14	13S	19E	
Imp-1971	Lithic scatter	5	13S	19E	
Imp-1972	Sherd scatter, trail	14	13S	19E	
Imp-1973	Trail marker, trail	14	13S	19E	
Imp-1974	Sherds	16	13S	19E	
Imp-1975	Trail marker, trail	14	13S	19E	
Imp-1976	Trail marker, trail	14	13S	19E	
Imp-1977	Trail marker, trail	14	13S	19E	
Imp-1978	Sherd scatter, trail	14	13S	19E	
Imp-1979	Trail marker, trail	14	13S	19E	
Imp-1980	Trail marker, trail	14	13S	19E	
Imp-1981	Trail marker, trail	14	13S	19E	
Imp-1982	Rock rings, possible shrine, trail	2	13S	19E	
Imp-1987	Lithic workshop	5	13S	19E	
Imp-1990	Cairn	17	13S	19E	
Imp-80	Trail cairn	17	12S	20E	21
Imp-81	Intaglios	10	13S	19E	22
Imp-265	Trail	14	13S	19E	28
Imp-266	Rock circle	18	12S	19E	4
Imp-404	Trail	14	12S	19E	16

TABLE 7
SITES PREVIOUSLY RECORDED
IN OR NEAR THE LEASE AREA
(continued)

Site Number	Brief Description	Site Type	Township	Range	Section
Imp-405	Trail	14	12S	19E	17
Imp-757	Cairn	17	16S	11E	28
Imp-1138	Report missing	--	--	--	--
Imp-1161	House pit	18	13S	19E	5
Imp-1367	Lithic scatter	5	13S	20E	5
Imp-1368	Sherd scatter	7	13S	20E	8
Imp-1369	Sherd scatter	7	13S	20E	8
Imp-1370	Rock rings	18	13S	20E	17
Imp-1371	Lithic scatter	5	13S	20E	17
Imp-1372	Flake scatter	5	13S	20E	21
Imp-1373	Flake scatter	5	13S	20E	28
Imp-1444	Report missing	--	--	--	--
Imp-1484	Trail	14	13S	19E	21
Imp-1797	Trail	14	13S	20E	15
Imp-1798	Sherd scatter	7	13S	20E	10
Imp-1799	Trail	14	12S	20E	10
Imp-1800	Rock circle	18	13S	21E	21
Imp-1806	Trail	14	13S	20E	11
Imp-1807	Sleeping circle	18	13S	20E	27
Imp-1870	Sherds, sleeping circle	2	13S	19E	35
Imp-1871	Sleeping circle	18	13S	19E	35
Imp-1872	2 sleeping circles	18	13S	19E	35
Imp-1873	Trail	14	13S	19E	*
Imp-1951	Sleeping circle	18	12S	19E	5
Imp-2412	Report missing	--	--	--	--
Imp-4213	Report missing	--	--	--	--
Imp-190	Trail, lithics	14	14S	20E	20-21
Imp-1374	Flaking station	5	14S	20E	10
Imp-1376	Flaking station	5	14S	20E	9
Imp-1377	Flaking station	5	14S	20E	27
Imp-1378	Rock ring flakes	2	14S	20E	27
Imp-1379	Sherd scatter	7	15S	20E	14
Imp-1380	Sherds	16	15S	20E	14
Imp-1381	Sherds	16	15S	20E	24
Imp-1382	Sherds	16	16S	20E	24
Imp-1466	Trail	14	15S	20E	13
Imp-1467	Trail	14	15S	20E	2
Imp-1468	Sherd scatter, trail	14	15S	20E	2
Imp-1469	Trail	14	15S	20E	2
Imp-1470	Trail	14	15S	20E	2
Imp-1471	Trail	14	15S	20E	13

TABLE 7
SITES PREVIOUSLY RECORDED
IN OR NEAR THE LEASE AREA
(continued)

Site Number	Brief Description	Site Type	Township	Range	Section
Imp-1472	Trail	14	15S	20E	13
Imp-1699	Trail	14	14S	20E	2
Imp-1700	Trail	14	14S	20E	3
Imp-1701	Trail	14	14S	20E	3
Imp-1703	Trail	14	14S	20E	4
Imp-1150	Sherd scatter, milling	4	16S	19E	15
Imp-119H	Report missing	--	--	--	--
Imp-1154	Cobble scatter, pottery scatter	5	15S	17E	5

*Unsurveyed

D. DISCUSSION

Several considerations are apparent from examination of the information collected during the present survey. First, all historic resources occurred in the Glamis area of the survey. None fell to the southwest of the Sand Hills. While this is undoubtedly an effect of differential access to the two areas, the total lack of historic materials in the Dunes zone is difficult to explain.

Variation in the prehistoric resources alone is interesting. Table 8 shows the distributional pattern of prehistoric resources between the Dunes and Glamis strata. A chi-square test run on the association between site type and survey zone failed to provide the necessary values to reject the null hypothesis of zone-site type association. The chi-square of 10.1241 with five degrees of freedom is not significant at 0.05.

Elimination of the isolated finds improves the results somewhat. However, the nature of the sites and the similar condition of the isolates makes this a questionable procedure. Even with the elimination of the isolates from consideration, a chi-square of 8.79 with four degrees of freedom is only significant at 0.06.

It is apparent through examination of Table 8 that ceramic scatters tended to occur in greater numbers in the Dunes area than in the Glamis zone. The statistical procedure, chi-square, fails to allow us to accept an association between zone and site type, however. The fact that there are several cells with less than five expected cases and several with zero observations makes the ultimate analysis less precise than ideally desired. The potential association between ceramic distributions and general setting will require information from further survey work.

In addition to the general site discussion, it is critical to evaluate the sample transect. It is the information gained on a transect-by-transect basis that permits a description of the sample universe. Table 9 provides basic descriptive statistics for the sample transects. Using this information, it is possible to project both historic and prehistoric resources to the population as a whole.

Temporally ignoring effects of stratification between the Dunes and Glamis zones, it can be stated that there is 95 percent confidence that the actual mean number of resources per transect lies between 1.50 and 2.49. Ninety-five percent confidence in the mean of prehistoric sites per transect

TABLE 8
CHI-SQUARE ANALYSIS OF PREHISTORIC RESOURCES

CONTINGENCY TABLES

Zone	Site Type 2	5	7	14	16	18
Observed Frequencies						
Glamis	4	1	4	1	22	4
Dunes	4	1	12	0	15	0
Expected Frequencies						
Glamis	4.24	1.06	8.47	0.53	19.59	2.12
Dunes	3.76	0.94	7.53	0.47	17.41	1.88

CHI-SQUARE RESULTS

With Isolates

Total number of observations (all cells) = 68
Number of expected frequencies less than 5 = 8

Chi-square = 10.1241
Degrees of freedom = 5
Level of significance = 0.0719

Without Isolates

Total number of observations (all cells) = 31
Number of expected frequencies less than 5 = 8

Chi-square = 8.79202
Degrees of freedom = 4
Level of significance = 0.0663

TABLE 9
PROBABILITY SAMPLE RESULTS

Variable	Mean	Variance	Number of cases
For All Transects Combined			
Total sites	2.01205	5.02395	83
Prehistoric sites	0.662651	0.946436	83
Historic sites	1.3494	4.01045	83
For Glamis Transects Only			
Total sites	2.26154	5.70083	65
Prehistoric sites	0.538462	0.710059	65
Historic sites	1.72308	4.47716	65
For Dunes Transects Only			
Total sites	1.1111	1.54321	18
Prehistoric sites	1.1111	1.54321	18
Historic sites	0.0000	0.00000	18

requires a range of between 0.45 and 0.87 resource per transect. For historic resources, the range is between 0.92 and 1.78.

Stratification by zone has the effect of reducing variability for prehistoric sites and increasing variability for historic sites. The reason for the historic increase is that no historic sites were found in the Dunes zone.

Using the 95 percent confidence level, projections of total number of resources for the sampled area can be calculated. Table 10 presents this extrapolation.

TABLE 10
PROJECTED SITE TOTALS
GLAMIS/DUNES STUDY AREA

Area by Site Classification	Number of Resources Minimum	Maximum
Sampled Area at Large		
Both historic and prehistoric	618	1,026
Prehistoric only	185	358
Historic only	379	733
Glamis Zone		
Both historic and prehistoric	529	738
Prehistoric only	87	192
Historic only	315	580
Dunes Zone		
Both historic and prehistoric	38	121
Prehistoric only	38	121
Historic only	0	0

III. MANAGEMENT CONCERNS

A. NATIONAL REGISTER

As part of the assessment of cultural resources involved in a federal action, potential impacts to sites potentially eligible for listing in the National Register of Historic Places must be considered. In this light, all resources found during the present survey were considered for eligibility to the register. A site or building can qualify for inclusion on the National Register for four reasons. These include resources that possess integrity of location, design, setting, and association and--

A. that are associated with events that have made a significant contribution to the broad patterns of our history; or

B. that are associated with the lives of persons significant in our past; or

C. that embody the distinctive characteristics or a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinctions; or

D. that have yielded or may be likely to yield information important in prehistory or history (Murtag 1976).

A variety of resources are specifically exempt from the register unless they meet several special criteria. Of principal concern for the present project is the exemption of any property which has "achieved significance within the past 50 years" (Murtag 1976:xvi).

The majority of the resources found during the present investigation would not qualify for the National Register. All isolated finds and recent historic trash must be dismissed as not potentially eligible. The isolated materials do not represent sufficient information potential to qualify under criteria D, and the majority of the historic material cannot pass the 50-year threshold criteria.

Prehistoric sites which may qualify for the register include T12-2, T33-4, T82-1, and T98-3. The remaining prehistoric sites are small ceramic and lithic scatters. Their low variability and size make them unlikely candidates for

register status. T12-2 is a trail with associated artifacts. It represents a rare opportunity to examine the nature of aboriginal travel in the desert, assess trade practices, and ultimately approach the role of different use areas (e.g., the role of Lake Cahuilla) in the settlement patterns of local inhabitants. T33-4 is a concentration of sleeping circles and artifacts of particular scientific importance. Only through examination of these types of sites can cultural affiliation, resolution of temporal questions, and determination of function be achieved. T82-1 gains its potential importance from the variety of materials present and the size of the deposit. While the majority of resources found in the lease area represent, at most, a single event, this site reflects either multiple use or use by a larger than usual group. T98-3 has a unique combination of materials. The existence of a piece of shell permits the association of the group responsible for this resource with groups from either the coast or the gulf areas. Additional investigation of this site may provide an expanded series of diagnostic traits for cultural/temporal affiliation of resources throughout the desert.

It should be emphasized that information about these sites is presently limited to survey results. It is possible that upon collection of additional data, they will not, in fact, prove to be eligible for the National Register. At the present time, however, the information potential appears sufficient to justify their consideration for listing.

While cemeteries are categorically exempt from the National Register, Site T28-1 is of particular historic importance. This site is a graveyard apparently dating to 1879. If this date is substantiated, the site represents one of the earliest historic resources in Imperial Valley. The date of 1879 corresponds to the construction of the railroad from Yuma to Los Angeles. As is discussed in the historic presentation above, this route ultimately led to the abandonment of the riverboat traffic on the Colorado River as the primary means of regional transit. Resources associated with this early period are rare, and the site's importance is readily apparent.

The military occupation of the area is the only other historic component found within the study area which might be considered eligible for the register. The center of the World War II desert use, Desert Center, is located north of the project area. While the use of the desert by Patton's forces is less than 50 years old, it is a significant element of America's history. The military resources found during the present survey are individually limited in type and

scope. When considered in association with the other military features in the California deserts, the area is potentially eligible for the National Register.

The remaining historic resources cannot provide sufficient information to qualify for listing under criteria D and provide no basis for rejecting the 50-year limitation on eligibility.

B. IMPACTS AND MITIGATION

1. Impacts. The development model employed for the Glamis/Dunes geothermal project identified five stages of potential impact: (1) preliminary exploration, (2) exploration drilling, (3) field development, (4) operation, and (5) close down. Impacts to cultural resources will occur as a result of the first three stages. The final two aspects will not impact cultural resources.

It is apparent from the projections of site numbers provided in the Discussion section of this report that development in the area could substantially impact the cultural record. With a minimum of 125 prehistoric sites and 315 historic sites--undoubtedly many more--any land-altering development would have a substantial impact on the local cultural record.

Impacts to specific resources must be considered on an action-by-action basis. At the present time, there is neither sufficient information on particular actions nor complete data on any given area to allow assessment of specific impacts. Since most of the resources identified in the sample are surface-only sites, it can be anticipated that any action disturbing the surface has the potential for impacting the area's cultural resources.

2. Mitigation. Mitigation of impacts to the cultural resources in the Glamis/Dunes area falls into three categories: (1) additional field surveys, (2) preliminary testing and research, and (3) preservation or conservation of the available information.

Additional complete field survey is necessary on any unsurveyed area scheduled for any proposed development stage. This inventory is necessary to assess specific impacts to particular resources. While the present investigation provided data which indicates that impacts will, unequivocally, occur, this complete phase is necessary to insure resource conservation.

Isolated materials should be mapped and collected during the preliminary field survey. Dealing with these resources when found will greatly reduce the scale, and consequently the cost, of subsequent investigations.

Preliminary testing and research involves the collection of information concerning the subsurface extent of important resources, mapping and collection of surface components, and preliminary analysis of recovered material. For

those sites which are limited to surface materials, this phase of investigation should achieve impact mitigation. On sites which have subsurface elements, or can be shown to require additional investigation, another more substantial phase of investigation or preservation will be necessary.

Final impact mitigation must be defined in accordance with the results of the preliminary investigations. Preservation, if a viable alternative, should be considered for any site which merits this stage of investigation. If preservation cannot be achieved, conservation through the recovery of a sample of the information stored within the site should be completed. Although the methods differ, this can be done for both historic and prehistoric resources.

Final mitigation programs should include the recovery of a reliable sample of the site's contents, detailed photographic and historic documentation, complete analysis of recovered materials and information, and preparation of a complete report of findings. All work should be done under the direction of a qualified archaeologist.

While specific mitigation recommendations cannot be made for the project as a whole, it is recommended that planning procedures incorporate the preservation of the historic graveyard. The difficulty in dealing with this feature through a recovery-type mitigative program and its historic significance make its preservation desirable.

IV. PROJECT PARTICIPANTS

Russell Kaldenberg	Archaeologist	BLM	Riverside
Alex Kirkish	Archaeologist	BLM	El Centro
Gail Egolf	Archaeologist	BLM	El Centro
Paige Talley	Ethnographer	---	---
Marvis Kelly	Field Archaeologist	BLM	El Centro
Laverne Conway	Field Archaeologist	BLM	El Centro
Glenda Foster	Field Archaeologist	BLM	El Centro
Maurene Steiner	Field Archaeologist	BLM	El Centro
Eric Ritter	Field Archaeologist	BLM	Riverside
Judy Reed	Field Archaeologist	BLM	Riverside
Chris Hardaker	Laboratory Archaeologist	BLM	El Centro
Donald Caylor	Laboratory Archaeologist	BLM	El Centro
Charles Bull	Archaeologist	RECON	San Diego
Carol Walker	Archaeologist	RECON	San Diego
Loretta Cornwell	Production Supervisor	RECON	San Diego
Cindy Bechtel-Groat	Production Specialist	RECON	San Diego
Eloise Feola	Production Specialist	RECON	San Diego

V. REFERENCES CITED

Aschmann, Homer
1959 The Evolution of a Wild Landscape and its Persistence in Southern California. Annals 49(3):34-56. Association of American Geographers.

Bada, Jeffrey L., George F. Carter, and Ray A. Schroeder
1974 New Evidence for the Antiquity of Man in North America Deduced from Aspartic Acid Racemization. Science. Vol. 184.

Barker, Michael, Erlinda Burton, and W. Morlin Childers
1973 A Preliminary Report on a Burial Excavation in the Yuha Desert of Imperial County, California. Manuscript on file at the Bureau of Land Management, Riverside, California.

Barrows, David Prescott
1967 Ethno-Botany of the Cahuilla Indians. Malki Museum, Inc. Morongo Indian Reservation, Banning.

Bean, Lowell John
1972 Mukat's People: The Cahuilla Indians of Southern California. University of California Press.

Begole, Robert S.
1973 Archaeological Survey in the Anza-Borrego Desert State Park: 1972 Preliminary Report. Pacific Coast Archaeological Survey. Annual Report (1962-1963). Los Angeles.

Berger, Rainer
1975 Advances and Results in Radiocarbon Dating: Early Man in America. World Archaeology 7(2):174-184.

Brooks, Richard H., et al.
1977 Phases 1 and 2 Archaeological Research in Imperial Valley, California. Manuscript on file at Nevada Archaeological Survey, University of Nevada, Las Vegas.

Bureau of Land Management
1981 Draft Environmental Assessment Record, Glamis/Dunes, Competitive and Non-Competitive Leases for Geothermal Exploration/Development. U.S. Department of the Interior.

Campbell, Elizabeth W. C., and William H. Campbell
1935 The Pinto Basin Site. Southwest Museum Papers, Number 9. Southwest Museum, Los Angeles.

Carter, George F.
1950 Evidence for Pleistocene Man in Southern California. The Geographical Review XL(1):84-102. New York.

1957 Pleistocene Man at San Diego. The Johns Hopkins Press. Baltimore.

1977 On the Antiquity of Man in America. Anthropological Journal of Canada 15(1):2-19.

1978 An American Lower Paleolithic. Anthropological Journal of Canada 16(1):2-37).

Childers, W. M.
1974 Preliminary Report on the Yuha Burial, California. Anthropological Journal of Canada 12:1-9.

Clements, T., and L. Clements
1953 Evidence of Pleistocene Man in Death Valley. Geological Society of America 64:1189-1204.

Davis, Emma Lou
1969 The Western Lithic Co-Tradition. San Diego Museum Papers, Number 6. San Diego Museum of Man.

1970 Archaeology of the North Basin of Panamint Valley, Inyo County, California. Five Papers on the Archaeology of the Desert West. Nevada State Museum Anthropological Papers, Number 15. Carson City.

1978 The Ancient Californians: Rancholabrean Hunters of the Mojave Lakes Country. Natural History Museum. Los Angeles.

1979 Stage 3 Inventory-Archaeological Notes and Views of East and West Mesas. Class II Cultural Resource Inventory, East Mesa and West Mesa Regions, Imperial Valley, California. Vol. 1. Manuscript on files at WESTEC Services, Inc., San Diego.

Eckhardt, William T.
1979 Cultural Resource Inventory of Areas Affected by Reject Stream Replacement Projects. Manuscript on file with the Department of the Interior, Bureau of Land Management.

Ellis, Robert and Robert H. Crabtree
1974 Archaeological Impact Statement on East Mesa Areas 1 and 2, Imperial Valley, California. Archaeological Research, Inc., Costa Mesa. Manuscript on file at Department of the Interior, Bureau of Reclamation, Lower Colorado Regional Office, Boulder City, Nevada.

Farr, F. C.
1918 The History of Imperial, California. Berkeley, Elms and Franks.

Font, Pedro
1971 The Colorado Yumans in 1775. The California Indians: A Source Book, R. F. Heizer and M. A. Whipple, eds. Pp. 247-254

Forbes, Jack
1965 Warriors of the Colorado. University of Oklahoma Press, Norman.

Gallegos, Dennis
1979 Class II Cultural Resource Inventory of the East Mesa and West Mesa Regions, Imperial Valley, California, preliminary report. Manuscript on file with the Department of the Interior, Bureau of Land Management, Riverside, and WESTEC Services, Inc., San Diego.

Gifford, Edward W.
1931 The Kamia of Imperial Valley. Bulletin of the Bureau of American Ethnology 97:1-94. Washington, D.C.

Harrington, Mark R., and Ruth DeEtte Simpson
n.d. Tule Springs, Nevada with Other Evidences of Pleistocene Man in North America. Southwest Museum Papers, Number 18. Southwest Museum. Los Angeles.

Haury, Emil W.
1950 The Stratigraphy and Archaeology of Ventana Cave. The University of Arizona Press. Tucson.

Hayden, Julian D.
1976 Pre-Altithermal Archaeology in the Sierra Pinacate, Sonora, Mexico. American Antiquity 41(3):274-289. Salt Lake City.

Hunt, Alice
1960 Archaeology of the Death Valley Salt Pan, California. University of Utah Anthropological Papers, Number 47. Salt Lake City.

Jennings, Jesse D.
1968 Prehistory of North America. McGraw-Hill, Inc., New York.

Jennings, Jesse D. and Edward Norbeck
1964 Prehistoric Man in the New World. The University of Chicago Press. Chicago and London.

King, Thomas Jackson, Jr.
1976 Archaeological Implications of the Paleobotanical Record From Lucerne Valley Area of the Mojave Desert. San Bernardino County Museum Association Quarterly XXIII(4). San Bernardino County Museum, San Bernardino.

Kroeber, A. L.
1925 Handbook of the Indians of California. Bureau of American Ethnology, Washington, D.C.

Maxon, James C.
1975 An Archaeological Reconnaissance of Four Small Sections of the Shoreline of Prehistoric Lake Cahuilla, Imperial Valley, California. Department of the Interior, Bureau of Reclamation, Lower Colorado Regional Office, Boulder City, Nevada.

Meller, Sidney L.
1946 The Desert Training Center and CAMA: Study No. 15. Army Ground Forces, Historical Section, Washington, D.C.

Minshall, Herbert L.
1976 The Broken Stones. Copley Books, San Diego.

Moriarty, James Robert III
1969 The San Dieguito Complex: Suggested Environmental and Cultural Relationships. Anthropological Journal of Canada 7(3):1-18.

Morton, Paul K.
1977 Geology and Mineral Resources of Imperial County, California. County Report 7. California Division of Mines and Geology. Sacramento.

Murtagh, William J.
1976 The National Register of Historic Places. U.S. Department of the Interior, National Park Service, Washington, D.C.

O'Connell, J. F.
1971 Recent Prehistoric Environments in Interior Southern California. Archaeological Survey. Annual Report, pp. 173-184. Department of Anthropology, University of California, Los Angeles.

Orr, Phil C.
1968 Prehistory of Santa Rosa Island. Santa Barbara Museum of Natural History. Santa Barbara.

Payen, Louis A., et al.
1978 Comments on the Pleistocene Age Assignment and Associations of a Human Burial From the Yuha Desert, California. American Antiquity 43(3):448-453. Salt Lake City.

Ritter, Eric W.
1975 Archaeology of the Proposed East Mesa Open Area in Imperial County: Assessment and Recommendations. Department of the Interior, Bureau of Land Management, Riverside.

Rogers, Malcolm J.
1929 The Stone Art of the San Dieguito Plateau. American Anthropologist 31:454-467

1939 Early Lithic Industries of the Lower Basin of the Colorado River and Adjacent Desert Areas. San Diego Museum Papers, Number 3. San Diego Museum of Man, San Diego.

1945 An Outline of Yuman Prehistory. Southwestern Journal of Anthropology 1(2):157-198. Albuquerque.

1958 San Dieguito Implements from the Terraces of the Rincon-Pantano and Rillito Drainage Systems. The Kiva 24(1):1-23.

1966 Ancient Hunters of the Far West. Union-Tribune Publishing Company, San Diego.

Rogers, Spencer
1977 An Early Human Fossil from the Yuha Desert of Southern California: Physical Characteristics. San Diego Museum Papers, Number 12. San Diego Museum of Man, San Diego.

Schuiling, Walter C., ed.
1979 Pleistocene Man at Calico. Quarterly of San Bernardino County Museum Association XXVI(4). San Bernardino County Museum, San Bernardino.

Smith, Karen
1978 The Reclamation of Imperial Valley, 1849-1916. Master's thesis, San Diego State University, Department of History.

Stanley, G. M.
1962 Prehistoric Lakes in the Salton Sea Basin. Geological Society of America Special Paper 73 (Abstracts for 1962), pp. 249-250.

Thomas, R. G.
1963 The Late Pleistocene 150 Foot Freshwater Beach Line of the Salton Sea Area. Bulletin of Southern California Academy of Sciences. 62:9-17.

Van Devender, T. R., R. Thomas, and W. Geoffrey Spaulding
1979 Development of Vegetation and Climate in the Southwestern United States. Science. 204:701-710.

von Werlhof, Jay
1977 Archaeological Survey of the Yuha Basin, Imperial County. Manuscript on file at Imperial Valley College Museum.

von Werlhof, Jay, and Sherilee von Werlhof
1975 Archaeological Examination of Certain Geothermal Test Well Sites on East Mesa, Imperial County. Manuscript on file with Imperial Valley College Museum, El Centro.

1976 Archaeological Examinations of the Sundesert Nuclear Plant Site. Manuscript on file at SDG&E, San Diego.

1978 Archaeological Examination of the Republic Geothermal, Inc., Test Field. Manuscript on file with Imperial Valley College Museum, El Centro.

von Werlhof, Jay, Sherilee von Werlhof, and Lorraine Pritchett
1977a Archaeological Examinations of Certain Geothermal Test Wells and Access Roads at East Mesa. Manuscript on file with Imperial Valley College Museum, El Centro.

1977b Archaeological Examinations of T16S, R17E, Section 7, East Mesa, Imperial County. Manuscript on file with Imperial Valley College Museum, El Centro.

von Werlhof, Jay, et al.
1979 Archaeological Investigations of the Magma Site, East Mesa. Manuscript on file with Imperial Valley College Museum, El Centro.

Wallace, William J.
1955 A Suggested Chronology for Southern California Coastal Archaeology. Southwestern Journal of Anthropology 11(3):214-230.

1962 Prehistoric Cultural Development in the Southern California Deserts. American Antiquity 28(2):172-180.

Wallace, William J.
1978 Post-Pleistocene Archaeology, 9000 to 2000 B.C. Handbook of North American Indians: California, Robert F. Heizer, ed. Pp. 25-36. Smithsonian Institution, Washington, D.C.

Warren, Claude N.
1967 The San Dieguito Complex: A Review and Hypothesis. American Antiquity 32(2):168-185. Society for American Archaeology, Salt Lake City.

Warren, Claude N., and D. L. True
1961 The San Dieguito Complex and Its Place in California Prehistory. University of California Archaeological Survey. Annual Report (1960-1961). Pp. 246-291. Los Angeles.

Waters, Michael R.
n.d. The Lowland Patayan Ceramic Tradition. Manuscript in preparation. San Diego Museum of Man.

1979 Late Quaternary Lacustrine History of the Salton Trough. Class II Cultural Resource Inventory East Mesa and West Mesa Regions, Imperial Valley, California. Vol. 1. Manuscript on file at WESTEC Services, Inc., San Diego.

Weide, David L.
1976 Regional Environmental History of the Yuha Desert. Background to Prehistory of the Yuha Desert Region. Ballena Press Anthropological Papers Number 5. P. J. Wilke and L. G. Bean, eds. Ballena Press, Ramona, California.

Weide, Margaret L.
1976 A Cultural Sequence for the Yuha Desert. In background to Prehistory of the Yuha Desert Region. Ballena Press Anthropological Papers Number 5, P. J. Wilke, ed.; L. J. Bean, series ed. Ballena Press, Ramona, California.

Wilke, Philip J., ed.
1978 Late Prehistoric Human Ecology at Lake Cahuilla, Coachella Valley, California. Contributions of the University of California Archaeological Research Facility, Number 38. Department of Anthropology, University of California, Berkeley.

ATTACHMENTS

ATTACHMENT 1

CULTURAL SEQUENCE FOR THE IMPERIAL COUNTY AREA

1. Prehistory. A proposed cultural sequence for any region is a framework based upon the past research and hypotheses of previous investigators. It identifies both what is known and what is not known within a given area. It is this data base which generates research questions and directs future scientific studies. The following cultural sequence for the southern Colorado Desert is included in this report to demonstrate background research and to point out some of the major unresolved questions relating to the prehistory of the region.

At the present time, there are many questions still unresolved relating to the prehistory of the Colorado Desert. The archaeology of this region is essentially a new frontier. Many vast expanses of arid desert lands contain evidence of prehistoric occupation. Although it has been known for some time that sites exist in desert environments, little intensive investigation of these resources has been undertaken. More recently, as desert lands have been extensively examined, the density and complexity of sites is becoming increasingly apparent. A cultural resource inventory of the Colorado Desert is gradually being compiled, and plans for future research are being formulated.

In the past, the majority of prehistoric research in southern California was directed toward coastal areas where site deposits seemed more substantial. Numerous sites in coastal areas have been studied. The earliest of these studies resulted in the formulation of interpretive divisions of cultural stages or sequences within each of which various patterns were hypothesized. The proposed major stages for southern California were the Paleo Indian stage, the Early Milling stage, and the Late Prehistoric stage.

The proposed cultural sequence for both the coastal and desert areas of southern California stems largely from the pioneering work of Malcolm Rogers in the 1920s and 1930s. Since then, the sequences suggested by Rogers have been only slightly revised. The most remarkable change has been the temporal extension of Rogers' basal sequences back into the Pleistocene epoch. Although professional controversy exists over the presence of an Early Man stage during the Pleistocene era, the proponents of this hypothesized stage have proposed great antiquity for these purported earliest prehistoric inhabitants of southern California. As will be discussed later, these claims have not yet been substantiated. The debate will undoubtedly continue until scientifically resolved.

Prepared by Carol J. Walker and R. Paige Talley

At the present time, four major cultural stages are proposed for the Colorado Desert: Early Man, Paleo Indian, Early Milling Stone, and Late Prehistoric. Within each of these divisions, various patterns and phases have been suggested. The Early Man stage, which includes the Pinto Wash and Malpais patterns, is said to occur in the late Pleistocene age. Following this is the Paleo Indian stage represented by the San Dieguito pattern and viewed as beginning at the close of the Pleistocene age and persisting until approximately 7000 B.P. This stage is succeeded by the Early Milling Stone stage which supposedly lasted until approximately 2500 B.P., when the Late Prehistoric stage appears. The Late Prehistoric stage continues until the historic period. This discussion of the proposed cultural sequence will present a brief resume on each of these stages and the patterns generally incorporated into the associated temporal framework.

Before presenting the resume of these proposed cultural stages, it is necessary to briefly discuss some inherent problems with the interpretation of sites in the Colorado Desert. First, there are presently no known sites with stratified deposits which permit the evaluation of the possible processes involved between proposed stages or proposed patterns. Secondly, other than Late Prehistoric sites and the controversial Yuha burial, there are no absolute dates associated with cultural stages. The fact that relatively few sites have been excavated contributes to this, as does a lack of datable material in association with sites. Third, relative dating has been used as an interpretive aid in the assessment of cultural stages. Relative dating has been based on geomorphology, chemical alteration on the surface of lithic artifacts, and lithic technological processes and tool types. There has not yet been sufficient research to permit the assignment of cultural stages on the basis of these relative dating techniques. Geomorphology refers to the location of sites in relation to morphological and geological features. The location of sites in relation to ancient landforms and relict watercourses and the mechanics of the incorporation of artifacts into desert pavements have been used as measures of the antiquity of sites. Such associations are valuable but not conclusive. The hydrologic history of Lake LeConte/Lake Cahuilla is intimately tied to the interpretation of sites. Research on this ancient lake is continuing to progress (Waters 1979; Stanley 1962, 1965). As an alternative means, the degree of chemical alteration, as well as the degree of weathering, has been used to designate antiquity of lithic artifacts. The reliability of both chemical alteration and weathering has not been adequately assessed and is controversial. The assignment of tool types

to various stages and patterns generally follows those types assigned by Rogers. Rogers' work was very thorough, but more definitive studies of the lithic technologies involved are needed, as well as comparison and correlation of assemblages from various sites to test the typologies.

Because of these difficulties associated with desert research, little is known of the temporal periods associated with the proposed cultural sequences. Nor do we understand the relationships, if any, between sequences. We do not know why cultural stages disappear or others appear. Do people move out of the area or do they merge with incoming groups? Or is it a combination of both? The origin of these stages is speculative as are the specific lifeways of each cultural group. It is only with continuing research that the answers to these questions will be found.

As previously stated, two prehistoric stages have been proposed as beginning in the Pleistocene epoch. These are the Early Man stage, which has been suggested to be of great antiquity, and the subsequent Paleo Indian stage, which is hypothesized as beginning at about the close of the Pleistocene age.

a. Early Man. Proposed dates for an Early Man occupation in southern California extend back as far as 100,000 years ago (Carter 1950, 1957, 1977, 1978; Minshall 1976; Simpson 1960; Schuilling 1979; Harrington and Simpson 1961; Orr 1968; Childers 1974; Clements and Clements 1953; and Davis 1970, 1978). The basis for these claims has been relative dating based on geological associations, the relationship of sites to ancient hydrographic features, weathering and chemical alteration of lithic material, and the nature of the lithic assemblage, which is generally the most technologically simple and comprises only a few crude tool types.

Early dates attributed to human skeletal materials in southern California have added impetus to these arguments. Laguna Woman from the Laguna Beach area has been radiocarbon dated at 17,150±1,470 years old and Los Angeles Man dated at 23,600 years old (Berger 1975:178, 181). Along the San Diego coast, Del Mar Man has been dated by the controversial amino acid racemization technique at 48,000 years ago (Bada et al 1974:792). Although these early dates have reinforced the arguments for Early Man, the accuracy of the dates has been questioned.

Within the Early Man stage, two cultural patterns have been proposed for the Colorado Desert. These two patterns are termed Pinto Wash and Malpais.

The Pinto Wash pattern is purported to date 37,000 to 50,000 B.P. (Childers 1977:22). Dating is on the basis of geological association. Lithic artifacts uncovered by a sand and gravel operation along Pinto Wash occur in soils which Childers feels are related to an early stand of Lake LeConte during this time frame, at a second locale five miles upstream. Artifacts exposed in a face of the wash lie immediately superior to the Palm Springs Formation, tentatively assessed at 45,000 years of age. Similar artifacts have been noted weathering out of this wash in Mexico (Minshall, personal communication 11-19-79). The Pinto Wash assemblage is described as follows:

> They are mostly large, weathered, crude and heavy. The tool types include scraper planes, axes or side-choppers, diggers (punctate and shovel styles), hammers, and scrapers or knives (von Werlhof 1977:67).

This proposed pattern can not be evaluated at this time. The arguments for dating based on the geological association and an analysis of the assemblage have yet to be presented. A publication addressing this is anticipated in the near future (Childers and Minshall in press).

The term Malpais is used to denote the most recent of these two Early Man patterns in the Colorado Desert. The term was originated by Malcolm Rogers who, beginning in the 1920s, conducted the first wide-scale surveys of the California desert area. As a result of these surveys, he proposed a chronological sequence for the desert with Malpais as the basal cultural pattern (Rogers 1939:74). In later years, this sequence was revised. Malpais was dropped from the parental horizon and changed to the initial phase of the Paleo Indian/San Dieguito pattern (Rogers 1958:3). Malpais has now been revived to describe a cultural pattern preceding the San Dieguito pattern (Hayden 1976:274; Begole 1973:32).

Dates of approximately 20,000 to 25,000 B.P. are now tentatively ascribed to this pattern in the Colorado Desert (von Werlhof, personal communication, 1979). In the Sonoran Desert, however, Malpais is hypothesized as beginning 30,000 to 40,000 B.P. (Hayden 1976:274). As a result of geological studies of Lake LeConte/Lake Cahuilla now in progress, Waters argues that Malpais dates some time after 26,000 B.P. His position is based on dated Pleistocene stands of Lake LeConte and the mechanics of the formation of desert pavements incorporating Malpais artifacts.

> Since the 100-foot stand of the lake is the youngest Pleistocene stand recognized (ca. 26,000 BP)

and, since it was eroded and alluvium deposited on it before the tools were dropped and incorporated into a forming desert pavement, implies that these tools are not associated with this (or any other) high stand of Lake Cahuilla. It can be inferred that the yet undated San Dieguito I and Malpais complexes must be younger than the 100-foot stand dated at ca. 26,000 B.P. (Waters 1979:34).

In contrast to this view, Childers proposes the association of Malpais artifacts with fluctuating Pleistocene lake stands (1977:24). Since the lldest Pleistocene lake stand dates at sometime bewween 37,000 to 50,000 B.P., and the yongest stand dates at 26,000 B.P. (Waters 1979:29), this would place Malpais within this time range. Childers' argument will require additional documentation.

In his early studies of the California desert lithic industries, Rogers noted the Malpais pattern to extend sporadically into western Arizona, Nevada, and lower California with the western side of the Colorado Desert being the most westerly occurrence (1939:6). The greatest concentration of lithic artifacts occurred along the Colorado River, in the desert between the river and Lake LeConte, and on both the east and west sides of the basin proper well back from the old Lake LeConte shoreline and associated washes.

As originally defined by Rogers, the Malpais pattern consisted of circular rock-rimmed clearings, gravel alignments, and a limited, technologically simple, lithic assemblage of teshoa flakes, bevelled flakes, and choppers, all fashioned by a poorly controlled percussion technique (1939: 7-18). Chemical alteration on the surface of the lithic material was the principal qualification used in determining relative age (Rogers 1939:19). In the later revision of his chronological sequence, the rock alignments were subsequently attributed to the San Dieguito pattern. In the context of more recent studies, the Malpais assemblage includes:

> . . . those tools of basalt and prophyry which exhibited considerable patination over highly weathered surfaces. Too, they were generalized tools, often large in size, and thick in relation to length and width. Further, the knappers prepared them by removing large flakes that often extended from the edge to the back, and sometimes across it. The shapes showed little control, being quite asymetrical from any view (von Werlhof 1977:68).

stage but the various phases. The lack of ecological remains leaves questions unanswered pertaining to the subsistence pattern. In the absence of stratified sites, possible relationships between phases and between the preceding and succeeding stages can not be determined. It may be that unraveling the puzzle of desert archaeology will require the use of techniques not yet fully developed.

c. Early Milling Stone Stage. The period circa 7000 to 2500 B.P. following the Paleo Indian Stage is referred to as the Milling Stone stage (Wallace 1954, 1955). It is marked by a change from a subsistence pattern with the main reliance on hunting to one with an emphasis on gathering. Geographical variants of the basic cultural pattern are evident in southern California coastal regions and southwestern deserts.

This cultural pattern coincides with the concept of a Western Archaic Desert culture as proposed by Jennings and Norbeck (1964) and Jennings (1968). Viewed as a component of a continent-wide archaic culture, this regional desert-adapted pattern is seen as a lifeway consisting of a foraging pattern indicative of efficiency of exploitation and increasingly complex technology. Wallace postulates the origins of this pattern as either deriving from the preceding hunting tradition or as a result of migration from the Great Basin (1978:28).

The early manifestations of this pattern are characterized by a lack of variety in the assemblage which is typified by a few crude lithic tools, milling stones, and rare, typically heavy projectile points (Wallace 1978:28). A pattern of increasingly diversified subsistence becomes apparent about 3000 B.C. (circa 4950 B.P.) with greater efficiency in exploitation practices and adaptation to localized resource bases. At this time, the artifact inventory is expanded, and specialized tools come into use. Various projectile point types, milling implements, and basketry are diagnostic artifacts (Jennings 1968:136).

Some evidence exists for the presence of small, nomadic groups in the Colorado Desert during this time frame, but information is currently extremely limited (Wallace 1978:28; von Werlhof 1979:28; Weide 1976:85-86). Of known sites, most are small campsites, lithic work areas, or rock shelters (von Werlhof and von Werlhof 1976c:14). The Truckhaven Man cairn burial produced a radiocarbon date of 3830±250 B.P. (Barker, Burton, and Childers 1973). Weide has suggested several reasons for what appears to be a lack of material remains from this period:

> . . . it is not unreasonable to suggest that the Yuha Desert area in fact had a very sparse population during this period, and that the activities that might have been carried on have left us little archaeological indications.
>
> During much of the period under discussion it seems unlikely that Lake Cahuilla maintained a prolonged high stand . . . that would have supported extensive human populations. Instead, much fluctuation in level resulting in extensive and frequent transgression/ regression sequences may have occurred, disrupting any archaeological remains within the reach of the waters.
>
> A final factor affecting the apparent sparsity of remains from this period is that collection of foods such as mesquite requires little equipment that is not perishable. Collecting sites from the ceramic period yield little more than pottery. Since basketry served as the functional equivalent during the period under discussion, the remains of a collecting camp would be primarily fire cracked rock, and flakes, easily obscured and mixed unrecognized into materials from subsequent use of the sites in ceramic times (Weide 1976:86).

With this lack of specific site information cultural patterns for this stage in the Colorado Desert are largely inferred from the Pinto Basin and Amargosan patterns in the Mohave Desert to the north.

The Pinto Basin pattern is a lithic assemblage identified in northeastern Riverside County along the banks of now dry watercourses (Campbell and Campbell 1935). Typologically similar assemblages are, however, known to occur over most of the southern California desert area (Wallace 1978:31-32). The Pinto Basin assemblage is characterized by the Pinto projectile point with weak, narrow shoulders and a concave base, leaf-shaped knife blades, drills, scrapers, scraper planes, hammerstones, choppers, and milling implements (Wallace 1978:31). A subsistence pattern consisting of both hunting and gathering has been suggested (Wallace 1978:31).

The Amargosa pattern is well defined in the northern Great Basin. In his early surveys, Rogers noted Armagosa sites were associated with the more recent water sources (1939:61). Phase I of this pattern is typified by

In northwest Sonora, Mexico, Hayden utilizes the term Malpais to describe a chopper/scraper industry hypothesized as beginning 30,000 to 40,000 B.P. (1976:274). Felt to correspond with Rogers' Malpais industry of the Colorado Desert, he views this pattern as the basal phase of the San Dieguito stage (Hayden 1976:280). Temporal placement is based upon three geologic phenomena: formation of desert pavements, formation of desert varnish on artifacts, and formation of below ground level caliche (Hayden 1976:274).

In summary, the Malpais pattern is poorly understood. An extensive study of the assemblage and the technological processes involved is needed. There are no absolute dates to substantiate its position in the temporal framework. The reliability of chemical alteration and weathering on lithic materials as indicators of age remains to be determined. In addition, its relationship, if any, to the subsequent San Dieguito pattern has not yet been established.

In addition to the patterns defined and purported to be Early Man, human skeletal remains recovered from a cairn burial in the Yuha area have yielded absolute dates of considerable antiquity. Radiocarbon dating of calcium carbonate adhering to the bones and overlying cairn boulders has produced dates of 21,500±2000 to 1000 B.P. and 22,125±400 B.P. (Childers 1974:1). A thorium 230 date on the calcium carbonate from the boulder caliche sample produced an age of 19,000±3000 B.P. (Bischoff et al. 1976:128). These dates have been questioned because of the inherent problems of contamination in this dating technique (Wilke 1978:444; Payen et al. 1978:448). Since dissolved carbonate in groundwater typically includes geologically ancient carbon of undetermined amounts, the dates ascribed to this burial will continue to be questioned until geochemical studies of the groundwater regime of the Yuha Basin have been performed (Weide 1976:83).

The physical characteristics of the Yuha burial show this single specimen to be somewhat similar in bone structure to the La Jolla along the southern California coast and decidedly different from the early Arizona populations and physical stocks of northern California (Rogers 1977:6). The implications, if any, of the resemblance to Early Milling coastal populations has not yet been determined.

b. Paleo Indian Stage. The best documented early inhabitants of the southern California Desert are the San Dieguito of the Paleo Indian stage. The period of San Dieguito occupation of desert areas is generally felt to date

from circa 11,000 B.P. at the close of the Pleistocene age to circa 7000 B.P. (Davis 1969:13; Warren 1976:168; Warren and True 1961:261: Moriarty 1969:2). More recently, von Werlhof (personal communication, 1979) has suggested an initial date of 20,000 B.P. for San Dieguito occupation of the Colorado Desert.

Deriving its name from the San Dieguito River plateau in western San Diego County where first recognized by Malcolm Rogers, this cultural pattern was initially termed Scraper-makers because of the numerous distinctive scrapers in the assemblage (Rogers 1929:457). In his initial chronological sequence for interior southern California deserts, Rogers designated San Dieguito/Playa as the more advanced lithic industry following Malpais (1939:74). He defined two phases of the San Dieguito/Playa industry which he viewed as a hunting economy penetrating the desert from the Pacific littoral or the Great Basin (1939:71). In later years, the Malpais, San Dieguito/Playa I, and San Dieguito/Playa II sequence was changed to represent three developmental phases of the same complex, San Dieguito I, II, and III (Havry 1950: 193, Rogers 1958:3). Rogers' differentiation and chronological placement of the various phases was based on typological study of surface artifacts, the degree of chemical alteration on the lithic material, and the geographical location of sites in relation to relict water sources (Rogers 1966:61, 63). With ensuing years, the San Dieguito complex was further defined, and a fourth phase present in Baja California was added (Rogers 1966:100).

During his early surveys, Rogers observed the San Dieguito pattern throughout the greater part of southern California, Baja California, and western Arizona, with a main locus in north-central San Bernardino County and a minor locus in the Pinto basin (Rogers 1939:27, 70). According to Rogers, these San Dieguito materials constituted "a cohesive pattern which is unique because of its simplicity, age, and great territorial distribution" (1958:8). Regional variations of this pattern were identified as four aspects: the southeastern, the southwestern, the central, and the western (Rogers 1966:24-25).

The area crossed by the proposed transmission line right-of-way in the Colorado Desert falls within Rogers' central aspect. Within this area, according to Rogers, sites of the first phase were located on terraces, mesas, and broad expanses of desert pavement, distant from modern water sources except along the terraces of the Colorado and Gila rivers (1966:39). Association with fossil lakes and stream channels was noted of sites attributed to the later phases (Rogers 1966:59).

The basic tool assemblage of the San Dieguito I phase is characterized by cores, hammerstones, teshoa flakes, a few blades, ovate bifaces, choppers, gravers, scraper planes, and a variety of scrapers (Rogers 1939:28-31, 1966:156-171). Tools from this phase are generally more massive than those of the latter two phases. Associated features consist of circular rock-rimmed clearings or sleeping circles, gravel alignments in either relief or intaglio techniques, and trail shrines (Rogers 1939:45-52, 1966:45-55). Improvement in form and technology with inclusion of more specialized tool types characterized the two sucessive phases along with the advent of pressure flaking in Phase III (Rogers 1966:61). Projectile points and crescentics appear in the third phase, which had evolved into almost a pure flake industry; a preference for amorphous lithic materials such as jasper, chalcedony, and obsidian becomes apparent in Phase III (Rogers 1966:61).

On the basis of the lithic assemblage, it has been suggested that San Dieguito represents an early hunting tradition (Rogers 1939:27, 1958:10; Warren and True 1961:275; Warren 1967:168). San Dieguito sites in desert provinces have lacked ecological remains from which environmental and economic patterns could be reconstructed. Subsistence patterns are not really known. A broad subsistence mode focused around a lacustrine economy has also been suggested (Moriarty 1969:115).

Since Rogers' early work, correlation with the work of other researchers (Campbell et al. 1937; Antevs 1952; Harrington 1957; Davis 1969, 1978; Hunt 1960) has indicated the San Dieguito complex is contemporaneous with a widespread Paleo Indian horizon in the Great Basin and southern California coast and desert area (Warren 1967:180; Wallace 1962:175; Warren and True 1961:271-272). The concept of a Western Lithic Co-tradition has been proposed for these widely distributed related lithic industries (Davis 1969:13). The San Dieguito pattern persisted until the advent of the Early Milling Stone stage approximately 7000 B.P.

Although more adequately defined than the cultural patterns of the Early Man stage, there is still much to be known about the San Dieguito of the Paleo Indian stage. These desert sites are primarily surface manifestations of lithic assemblages which are assigned cultural affiliation based on tool typologies. Chemical alteration of artifacts is again relied upon as a means of relative dating. Material necessary for radiocarbon dating has not been found in association with these sites. Therefore, there are no absolute dates permitting accurate temporal assessment of not only the

broad corner-notched dart tips with squared bases, blades, drills, flake scrapers, and slate pendants. In Phase II, there is a change to long, slender points with corner notches and to projectile points for use with the bow and arrow. Milling implements and ceramics are present in the second phase as well as possible exploitation of turquoise deposits (Wallace 1962:176). The pattern is viewed as reflecting well-developed hunting and gathering practices and lacustrine adaptation (Weide 1976:86-87).

Presently, the relationship of the Pinto Basin and Amargosa patterns to the southern Colorado Desert is unknown. It is possible that continued research will provide more ample evidence of similar patterns in this area.

It has been suggested that during this general time period, desert-dwelling peoples migrated to coastal areas in response to environmental stress during a period of increasing aridity and subsequent scarcity of resources (Wallace 1962:175). More recent research now indicates that climatic changes in desert provinces may not have been as severe as earlier believed (van De Vender and Spaulding n.d.:709; King 1976:188). This proposed hiatus in the occupation of the Colorado Desert between the Paleo Indian stage and the Late Prehistoric stage is therefore unexplained.

On a broader scale, the relationship of the Milling Stone stage as postulated for coastal southern California to both the preceding Paleo Indian stage and the succeeding Late Prehistoric stage has not been adequately defined. This obviously is related to the postulated similar cultural expressions in the Colorado Desert and, when resolved, will aid in our understanding of the prehistory of this period.

d. Late Prehistoric. Malcolm Rogers' (1945) work has been the predominant source used in reconstructing the southwestern Late Prehistoric era. Michael Waters and Albert Schroeder have revised and rearranged Rogers' endeavors and, therefore, will be discussed following comments regarding Rogers' thesis.

Rogers assigned the nominal term Yuman to the pottery-making people of the Southwest. Three broad cultural divisions based on pottery types were used by Rogers, dividing the Yuman Late Prehistoric era into three chronological zones: Yuman I circa 800 to 1050 A.D.; Yuman II circa 1050 1500 A.D.; and Yuman III circa 1500 to historic A.D.

The center for Yuman I was near the intersection of the Colorado and Gila rivers, whereby the Colorado River Valley was more heavily populated. Criteria established for the interpretation of the Yuman I phase is based on trails, trail shrines, and small cave deposits. Logically, Rogers used pottery as a diagnostic for analyzing the Yuman I phase and, thus, continued with Yuman II and III.

Yuman I pottery characteristics are equated with the Pueblo I and Basketmaker III ceramics of northern Arizona. Many of the characteristics appear to be common to many of the southwestern cultures; however, certain configurations unique to the area in question exist. These characteristics are "certain forms, basket-molding, rim-notching and the Colorado-shoulder". (Rogers 1945:182).

Based on the collective knowledge of the area at the time of Rogers publication of the Yuman prehistory, he suggested the Yuman I people imported a myriad of ideas from exogenous cultures. Few, if any were exported. Rogers stated that all intrusive pottery types of equal antiquity as Yuman I were of Hohokam origin, and these were predominantly of the Sedentary Period. However, he was quick to point out that the Hohokam sherds were of no value in affording evaluation for the "beginning of the Yuman I pottery making; the sherds were located only surficially" (Rogers 1945:185).

A gradual change in the treatment of existing forms in Yuman I and the addition of new forms and painted designs indicates the transition from Yuman I to Yuman II.

Rogers sets the dates for Yuman II at circa 1050 to 1500 A.D. This era is marked by "rapid diffusion of pottery-making, with the probable expansion of Yuman groups into new territory . . ." (Rogers 1945:190). Yuman II expansion is evidenced up the Colorado River to Black Canyon and west in the northern portion of the Mojave Desert. Cultural deposits surrounding the Blake Sea (Lake Cahuilla) shoreline are predominantly Yuman; however, there is some intermixing of late Yuman I pottery types. Rogers believed Lake Cahuilla had its greatest occupation with Yuman II.

Yuman III evidenced a change in demography. Lake Cahuilla became a dry playa by 1450 A.D. and the inhabitants migrated southeast to the Pacific Coast and as far south as the Colorado River delta. Rogers gives a date for the Yuman III phase of circa 1500 to historic A.D. As the Yuman populations migrated from the Mojave Desert, "the Shoshoneans in from the west and Paiute bands down from the north, while farther to the southwest the Serrano and

Cahuilla penetrated somewhat into Yuman terrain . . ." (Rogers 1945:194). Cultural diffusion attained its peak at this phase, affording cultures such as the Chemehuevi and southern Californian Shoshoneans to include pottery in their material culture.

Albert Schroeder, while in basic agreement with Rogers' development of Yuman expansion, disagreed with his chronology (1952 and 1975). Schroeder assigned pre-ceramic phases prior to circa 900 A.D. Indicative of these phases was Basketmaker II and a roasting pit (the one non-Basketmaker characteristic belonging to the preceramic phases). Other traits included in the preceramic phase were the scoop metate, stemmed dart points, choppers, and incised stones (Forbes 1965:11).

Schroeder's 900 to 1150 A.D. period (equivalent to Rogers' Yuman II 1050 to 1450 A.D.) is inclusive of Lower Colorado Buff Ware, possibly having its origins above Parker, where Prescott Gray Ware is also located. Schroeder believes Pyramid Gray ceramics, Nevada Puebloan, and Prescott Gray Ware are all indigenous ceramics, while Hohokam intrusives are associated with Lower Colorado Buff Ware (Forbes 1965:12).

It was not until circa 1150 A.D. that Colorado River Red Ware appeared, indicating diffusion from the Hohokam ceramics, thus entering the Yuman III phase.

Michael Waters (unpublished manuscript n.d.) believes Rogers' term Yuman for a cultural sequence expanding over a period of 700 years is too confusing with the tribe of people designated the same name, so has decided to assign Colton's Patayan term instead. Pottery and other cultural materials prompted Waters to separate Patayan into three cultural phases: Patayan I, II, and III. Waters has not changed the chronology of Rogers so much as he has expounded on Rogers' endeavors, filling in the voids when necessary. Waters traced cultural divisions to characteristics found only in Patayan, designating the remainder Southwestern Culture.

Waters is in concurrence with Rogers' contention that the Patayan I pottery characteristics are similar to Vamori phase ceramics from Valshni Village (circa 800 A.D.). These common characteristics are "certain forms, burnishing, red-on-buff decorations, body incised decorations, burnished red clay slip, paddle and anvil manufacturing technique, and certain zoomorphic and geometric design elements" (Rogers in Waters n.d.). Waters notes that

intrusive Hohokam sherds occur in Patayan territory as early as circa 700 to 900 A.D. These are Santa Cruz Red-on-Buff and Gila Plain of the Santa Cruz phase. Waters identifies the Patayan I period as spanning approximately 500 years (circa 500 to 1000 A.D.). This date is considerably earlier than proposed by Rogers. Patayan I pottery types are evident as far east as Yuma, north to the Mojave Sink, west to Lake Cahuilla, and south to the Colorado Delta and Sonora, Mexico.

Tizon Brown Ware, making its appearance circa 700 A.D., is classified by Waters as Upland Patayan. Tizon Brown Ware sherds have been located in Baja California, in the mountains of southern California, and through the Mojave Desert into Arizona. Waters believes Tizon Brown Ware is of little diagnostic value due to the similarity in sherds and, thus, suggests they all be typed as one kind, distinguishing only between regional varieties.

The transition from Patayan I to Patayan II is indicated by the termination of certain traits and the introduction of new ones. Those terminated traits are burnishing, burnished red clay slip, incising, some forms, punctuate designs, rim notching, the Colorado shoulder, chimney neck, heart-shaped body, and lug handles. The introduction of new traits saw curved rims, new forms, stuccoing, and an increase in fire-lined geometric designs. Patayan II corresponds to Bouse's Phase II and is directly associated with ceramics of Verde Black-on-Gray of the Prescott culture of northwestern Arizona and also with ceramics of Hohokam Gila Red, Gila Plain, and Hohokam Buff Ware. Waters proposes a span of 500 years for the Patayan II phase (circa 1000 to 1500 A.D.). Patayan II evidenced marked expansion of groups into foreign territories and rapid diffusion of pottery-making.

Patayan II pottery sherds have been located along the Colorado River in southern Nevada, west of the northern half of the Mojave Desert, and east into Arizona. There is no evidence of southern expansion past the Colorado River Delta. Intrusive Anasazi and Hohokam ceramics have been located within Patayan II territory. However, because all three ceramic types "were apparently so fully developed", they exhibited no substantial influence on one another (Waters n.d.).

Near the end of the Patayan II phase, Lake Cahuilla and large bodies of water in the Mojave had dried to leave only lakebeds. This created a population migration from Black Canyon down to the Colorado River Delta. This period also marks the beginning of Patayan III (circa 1500 to historic A.D.).

New pottery traits for Patayan III are "reinforced rim band on the rim margins of some vessels and a new form, a high-necked small-mouthed water olla found in the desert regions" (Waters 1979:78). Patayan II traits were refined for this period, but the basic forms remained static.

Colorado Buff became a new pottery type evolving from an attempt to standardize pottery making along the river. European contact eventually brought about the termination of indigenous forms of pottery-making whereby the Patayans became proficient at imitating coffee cups, loop handles, pitchers, and various other European-type objects.

Many researchers (e.g., Kroeber 1925; Forbes 1965) maintain the assertion that Hohokam pottery is the ancestor to pottery of the Quechan, Mojave, Pima, and Maricopa peoples and, although experts debate to what extent the Hohokams influenced other Indian cultures, they do agree that the Hohokam culture did, for the most part, have an impressive impact on their neighbors.

ATTACHMENT 2

REPORT FOR
GLAMIS/SAND HILLS ETHNOGRAPHIC STUDY

Prepared for

DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT
1695 SPRUCE STREET
RIVERSIDE, CALIFORNIA 92507

Prepared by

R. Paige Talley

R. PAIGE TALLEY
ETHNOGRAPHER

15 JUNE 1980

TABLE OF CONTENTS

		Page
I.	INTRODUCTION	1
II.	ETHNOGRAPHIC DESCRIPTION	2
	A. THE KUMEYAAY	2
	B. THE QUECHAN	4
	C. THE COCOPA	7
III.	INTERVIEWS	10
	A. THE KWAAYMII (KUMEYAAY): Tom Lucas	10
	B. THE QUECHAN: George Bryant and Leroy Ward	14
	C. THE COCOPA: Pete Soto	16
IV.	RESEARCH CONCLUSIONS	17
V.	PERSONS AND AGENCIES CONSULTED	18
VI.	BIBLIOGRAPHY	19

I. INTRODUCTION

This ethnographic investigation was performed for the Bureau of Land Management in order to gain knowledge of Native American concerns within and near the Glamis study area. The Native Americans interviewed were asked to comment on their past life ways in relation to the project area and too, if they held any objections to the potential development of geothermal activity in the area.

The research was undertaken with the knowledge and understanding that the project area is not presently, and has not been for sometime, inhabited by Native Americans, and that therefore, seeking individuals knowledgeable of their cultural activities in the area may prove to be a difficult task, as it was.

Literature research on past ethnographic accounts proved a useful aid in assessing who aboriginally utilized this region and for what purposes, but only peripherally to the project area. Not surprisingly, the Cocopa were unaccounted for this far north of the Colorado River delta. However, telephone conversations with an enrollee of the Cocopa Indian Reservation in Somerton, Arizona revealed that the Cocopa did, in fact, travel into California as far as the Chocolate Mountains.

One hundred and sixty hours were allotted for the project, which allowed for only limited interviews with knowledgeable individuals of cultural groups associated with the project area. Native American groups maintaining knowledge of utilization for this area are the Quechan, Cocopa, and the Kumeyaay/Kwaaymii. Individuals representing each cultural group were Leroy Ward and George Bryant of the Quechan Indian Reservation, Pete Soto of the Cocopa Indian Reservation, and Tom Lucas, the last known member of the Kwaaymii, an off-shoot of the larger Kumeyaay group. Vera Brown, an enrollee of the Viejas Indian Reservation, offered information aiding this researcher to evaluate the Kumeyaay's travels into Imperial County.

In general, the research results are as follows: None of the individuals interviewed were adverse to the potential development of geothermal activity within the project boundaries (except for a portion of the Pilot Knob area which will be explained in detail later) and, that to the best of their knowledge the area was used as a travel route and for occasional camping and foraging while en route to a distant destination.

The brief ethnographic description of the Kemeyaay, Quechan, and Cocopa is by no means meant to serve as a complete ethnohistory of each group, but rather an addumbration of their past life ways. Because the Kwaaymii were a subgroup of the Kumeyaay and their cultural characteristics were so similar it is not necessary to make a distinction between the two groups in the ethnographic description.

II. ETHNOGRAPHIC DESCRIPTION

A. THE KUMEYAAY

Prior to Spanish contact the linguistically affiliated group of Indians inhabiting land ranging from the Pacific Ocean bordered by Luiseno, Cupeno, and Cahuilla to the north and undefined borders to the east and south (perhaps extending as far south as Arizona to the east and northern Baja California to the south) were known as the Tipai and Ipai (Kroeber 1925; Luomala 1978; Spier 1923). These native names simply mean people, the former being used to distinguish the southern groups from the latter or northern groups (Luomala 1978). More recently some Tipais and Ipais have used the term Kumeyaay for a collective designation as their tribal name. Until the 1960's most ethnographers employed the term Diegueno to encompass both the northern and southern groups of Tipai and Ipai people, and this was a name given them by the Spaniards. The Spanish name San Diegueno was derived from the Mission San Diego de Alcala, established in 1769 and assigned only to the Indians inhabiting the mission region; however, the term was later shortened to Diegueno and included those people culturally and linguistically affiliated with them (Luomala 1978).

The Diegueno language is from the Yuman language family and derived of Hokan stock. Kroeber (1925) and Luomala (1978) note slight dialectic differences among the Kumeyaay[1] speakers, with those bands in closest geographic proximity having the ability to converse with one another much easier than with those bands on the periphery.

The inhabitants of northernmost Baja California speak a Diegueno[2] dialect which is similar to that spoken by people living just north of the international border. While they are called Bajeno Diegueno, this term is applied only because of their geographic spacing, Mexico, (Kroeber 1925). A final note on the subdivisions of the Kumeyaay must include the Kamia of Imperial Valley. Gifford (1931) purports the Kamia to be of Kumeyaay origin (their dialect is subsumed under Diegueno); however, because they moved into Imperial Valley, their cultural traits became more expressive of the Quechan, from whom they adopted agriculture, rather than from the Kumeyaay.

There is question among anthropologists as to the existence of sibs and clans among the Kumeyaay (Gifford 1918; Kroeber 1925; Luomala 1963). Gifford explains the Kumeyaay as possessing no totems, reckoning patrilinally, and practicing clan exogamy (1918). Kroeber (1925) explains the Kumeyaay as possessing exogamous patrilineal clans but qualifies this conviction by adding that these clans are elementary and only a shell of the

---

[1] For the sake of clarity the term Kumeyaay will be used throughout this section.

[2] The term Diegueno is still used in reference to the Kumeyaay's language designation.

true definition of what constitutes a clan system. Lucmala (1963) describes the Kumeyaay as possessing sib affiliations; however, these group associations are not definitive in practice. In fact, it is possible that these social groups can be conceived as local groups maintaining reminscences of the clan/sib system.

The Kumeyaay's social organization was such that they lived patrilocally and reckoned patrilineally. The household was comprised of the consanguineal kin group, and the village community was composed of a residential group. Often, due to various environmental changes or sometimes death of village members, a village site was abandoned and the residence group was segmented into small kin groups which traveled singly to other villages or visited relatives (May 1974). While clans (or sibs) protected individually owned tracts of land for resource purposes, the territory was only protected seasonally (Spier 1923).

Dwellings were constructed of a myriad of plant material; Yucca, Chamise, grasses, Manzanita, and various other raw materials were utilized in the construction of winter homes (Luomala 1978; Spier 1923). The structures' foundations were just below the surface, and the roof was dome-shaped. Some of the southern Kumeyaay dwellings were covered with bark and pine slabs while still others sought shelter in large caves (Lucmala 1978).

Some structures were for ceremonial purposes only, and these were owned by the entire village (Luomala 1978; Spier 1923). Clan chiefs were the highest authority among each band and each chief had one assistant chief. Chief status was inherited by the oldest son, and only on rare occasion did a woman assume the role of chief (Luomala 1978). The clan chiefs in conjunction with shamans, performed religious ceremonies as well as serving as political chiefs (Spier 1923).

Ceremonies included, but were not exclusive to, the boy's puberty rites, fire ceremony, ridiculing ceremony, eclipse dance, and the cremation ceremony (May 1974). The cremation ceremony is performed upon the death of a band member and takes precedence over any other activity occurring at the time of death (May 1974).

With the advent of Euro-american contact, the Kumeyaay have gradually become acculturated such that they no longer practice most of their native traditions. Many of the bands, once autonomous triblets, have been combined by the federal government to form a larger group and placed on reservations throughout San Diego County. This activity, along with an attempt to Christianize the Indians by the Spaniards and Mexicans, resulted in termination of power among the small local groups.

B. THE QUECHAN

The Quechan, formerly designated Yuma, inhabited the west and right banks of the Colorado River; extending approximately sixty miles north of the Gila and Colorado confluences and approximately fifteen miles south from the Gila and Colorado confluences (Harrington 1908; Kroeber 1920). These people speak a Yuman dialect of the Upriver subdivision. Included in this division of the Yuman family are the Mojave, Maricopa, Halchidhoma, and Kaveltcadom (Forbes 1965).

The creation story, as told by Emerson (1971), explains that the Quechan originated from a mountain peak in California near the town of Needles (this mountain peak is called Avikwame). Forbes (1965) also refers to this mountain peak as the place where the first mourning ceremony, Keruk, was held for one of the two Quechan makers, Kwikumat, who had died. The ceremony was observed to protect people against evil and to give them great power. The people then spread themselves throughout the Colorado River to take their prospective places in the world (Forbes 1965; Harrington 1908) thus, the variety of tribes in the river region.

The Quechan practiced horticulture, planting pumpkins, melons, and beans during the month of July after the river flooding had subsided (Forbes 1965; Kelly 1977). They also planted and harvested some maize, cotton, and tobacco and supplemented their agricultural subsistence on mesquite beans, fish, and game. Usually the river provided the Quechan with sufficient food stuffs to carry them through each year.

Quechan mode of dress was kept at a minimum; the women wore bark or cloth skirts, while the men adorned only a blanket in the winter months and went nude during the warm weather months. Early historic accounts have been recorded where the Quechan were observed carrying "a lighted firebrand in the hand" by which to warm themselves during the cold season (in Forbes 1965:49). However, with the advent of Spanish encroachment, by the early 1800's the Quechan men began covering themselves with loin cloths (ibid).

Quechan dwellings varied depending upon the topography of the area they inhabited and the weather conditions. Some houses were constructed of mud covered logs while others were grass huts built underground with straw for roofing. These dwellings were apparently large enough to house more than one hundred individuals (Forbes 1965). These type of dwellings were noted prior to 1669 at which time Mange (in Forbes 1965) described the dwellings as still large and accomodating more than one hundred persons, however, the structures were held by poles used as pillars, small beams, and flat roofs. Standing inside the dwellings was not possible; one had to assume either a supine or sitting position. A ramada (introduced by the Mexicans) was constructed at the front of the door for summer sleeping (Forbes 1965).

Dreaming was an active and important element to the Quechan existtence and cosmogony. Dreaming is equated with power and knowledge, for they

believed that what they dreamed fortold future experiences as well as something that had already occurred. They believed that everyone could dream but only a select few possessed the ability to dream as professionals (Harrington 1908).

Religion and ceremonies were mostly restricted to the Keruk (mourning or cremation ceremony) and the harvest ceremony, which occurred as a festival. These two ceremonies were most significant because the Quechan concentrated on abundant food supply and a gain of power through dreaming (Forbes 1965).

Although the Mojave are probably best noted of the river Yuman tribes for their far reaching travels, the Quechan traveled at length for purposes of trade, visitation, and warfare (Dobyns et. al. 1957). This latter factor initiating travel was prevalent with almost all the Yuman speaking tribes along the river, and the occurrence of warfare, while intensified post Spanish contact, was readily apparent prior to Euro-american influence (Dobyns et. al. 1957). In fact, the Quechan led a sovereign life until the late nineteenth century; except for a brief period in 1780 when two missions were established by Sonoras Military Commander. During the first year of 'service' these missions were destroyed by the Quechan (Harrington 1908). It seems, due to the Quechan's geographical distance from the Spanish powers that be, that cultural change was difficult to enforce (Dobyns et. al. 1957). Dobyns et. al. (1957:63) explain the tenuous riverine life as follows:

> The hostile contact situation involving Spaniard and Yumans, and the hostilities between Yuman-speaking tribes themselves, meant that riverine life was quite insecure. Enemy attack was the aspect of life over which individuals held least control.

Accompanying this consistent engagement in warfare was the theme of male superiority manifested in horse and slave raids, torturing and killing enemies, and the giving of enemy women as wives to the old men in the tribe (Dobyns et. al. 1957).

Though the Quechan were not necessarily adept at battle on horseback they did learn, ironically from the Spanish, how to lodge raids against the Spaniards, seizing their horses and decimating their armies. Not only did the Quechan(and other river tribes) use horses for battle but also for food (Dobyns et. al. 1957).

Politically the Quechan were rather unique when compared to other river Yuman tribes. They had a central role of authority, the Kwoxot, and again dreaming, the icama, comes into play. The Kwoxot represented the "will of the people" and he was neither an elected official nor did he inherit the position[3], but assumed the leadership and accompanying responsi-

---

[3]Contrary to Forbes, Kroeber (1925) contends the Quechan are similar to the "Californians" in that they practice "... hereditary Chieftanship..." (p. 795).

bilities on his merit (Forbes 1965:68). This due to his icama experiences allowing him the professional power to act in such a manner to assume this responsible position. The Kwoxot's responsibilities were much like any other leaders; they were expected to set examples of goodness, maintain great spiritual power and maintain the admiration and respect of their followers. This type of behavior was expressed by hosting great feasts, seeing that the poor and the needy were sufficiently cared for, healing the ill, keeping many scalps, seeing to it that the prisoners of war did not escape, and delivering public speeches (Forbes 1965).

Eventhough the Quechan had a central leader they did maintain several other leaders from each Quechan settlement or band. These leaders were called 'pipa taxan' translating to "good for the people" (Forbes 1965:69). Among these leaders was a man called the 'Kwanami', meaning brave man, The Kwanami came to his position through icama and his duties were to act as war chief. Thus, although the Quechan were one of a few tribes that practiced central leadership they did allocate the position of war chief to another, just as with most southern California and river Yuman tribes (Forbes 1965).

In 1908 the Quechan Indian Reservation (located in Winterhaven, California just outside of Yuma, Arizona) population was approximately 960 persons plus approximately 60 individuals associated with other river groups (Harrington 1908). In 1965 the population of Quechan residing on and adjacent to the reservation numbered almost 1,000 (Bee 1970). Today, as told this researcher by Tommy Munoz, Business Administrator for the Quechan Indian Reservation, the population is nearing 3,000.

C. THE COCOPA

The Cocopa formerly inhabited the delta region of the Colorado River, now known as Sonora and Baja California. Approaching the late nineteenth century the Cocopa were approximately 1500 in population and were dispersed throughout the Baja side of the Colorado River delta (Kelly 1977). Presently, a majority of the Cocopa reside in Somerton, Arizona on the Cocopa Indian Reservation, though there are many still remaining in Baja California.

The Cocopa speak a Yuman dialect of the Delta subdivision; this division includes groups like the Kahwan, Halyikwamai, and southern Kumeyaay (Forbes 1965; Kelly 1977).

The first recorded account of the Cocopa occupying the mouth of the river delta was in 1605 by a Spaniard named Onate. One hundred years later a missionary by the name of Father Kino traveled through the delta region and though he made no record of the Cocopa, he did make notice of two groups which Kelly believes may, in fact, have been the Cocopa; they were the Coanopa and Hogiopa. Father Garces entered the delta sometime between 1771 and 1776. During this time he reported the 'Cucapa' to be 3,000 in number and occupying the west side of the Colorado River delta (Kelly 1977).

The Cocopa were agricultural people, usually planting crops such as maize, teparies, and melons in fields in river overflow basins. As with the Quechan the Cocopa planted their crops in July after the river flooding had subsided and harvested their crops in September. The Cocopa were also known to harvest wheat and sugar cane (Drucker 1941; Gifford 1933; Kelly 1977).

Weeding was accomplished by both genders with the aid of a side bladed weed cutter, a dibble, or by hand. Mesquite was gathered with a hook and the beans were ground in a mortar by the women (Drucker 1941). Storage containers for the harvested grains, fruits, and vegetables were most common in the form of pottery ollas and birds nest woven baskets Drucker 1941; Gifford 1933).

Various animals were hunted or snared; among them the predominant takes were deer and rabbits. The Cocopa used horses, a European introduction, to hunt deer and had communal drives on foot to capture rabbits (Gifford 1933). Fish were an important and abundant food source, caught in nets or shot with featherless arrows (Drucker 1941). Gifford (1933) notes that humpback whales were taken from lagoons with gill nets or with dip nets and with bows outside of the lagoons.

Eggs were a delicacy and considered to be an important food source. Some Cocopa inhabiting the west side of the delta where farming was not profitable traded eggs to the east side farmers for farm products (Kelly 1977).

Kelly's Cocopa sources explained that the Cocopa ate rats at one

time when preferred animals were not available (1977). Chittenden, writing in 1901, described a Cocopa family dinner, which he was in attendance, consisting, among other edibles, of roasted rats; the partakers, excluding Chittenden, devoured them as soon as they were finished roasting. He made no mention of their not having an adequate food supply, however, the fact that the family was eight miles away from their village site may have been the reason for their feasting on rats.

The Cocopa shared their food with anyone in need and always extended the courtesy to friendly vivitors who were not of Cocopa tribal affiliation (Chittenden 1901; Kelly 1977).

It was considered a major infraction to eat doves for they were a totem animal and therefore taboo for anyone to consume (Kelly 1977).

For the purposes of traversing the Colorado River the Cocopa used logs which they paddled across with; bundles of tules, probably manipulated the same as the logs; and rafts, constructed of willow and cotton wood roots. Ollas made of pottery were used to 'float' infants across the river while their mothers swam beside them (Gifford 1933). Not only was the river used to aid in travel but also for drinking purposes; however, when the river did not meet their needs for potable water they hand dug shallow wells which proved to be cleaner than the murky river water (Gifford 1933).

With the influx of the Spanish and Mexican the Cocopa gradually incorporated some of these external culture characteristics to mix with their own. This may be evidenced in the house structures during Gifford's and Kelly's research (1933; 1977). The pre contact dwellings were slightly subsurface, approximately 2.5 feet below surface, the shape was square or rectangular, the roof was flat, and the whole structure was covered with soil, roots, and branches. The introduction of the ramada and its function in the Mexican culture was well accepted by the Cocopa. It was constructed of the same material as the main dwelling. Houses usually accomodated 40-50 individuals, though the added ramada could hold as many as 100 persons (Kelly 1977).

Most of the Cocopa practiced monogamous marriage patterns but there were those men that possessed more than one wife, however, the reverse did not seem to occur (Kelly 1977). Their marriage custom was to first have trial marriages, though the couple was not to have sexual intercourse until their relationship was condoned by their parents. The trial marriage period could last for several years, during which time the couple may be with several partners (Kelly 1977).

The ideal living pattern was patrilocal, however, exceptions were not uncommon; Kelly's ethnography of the Cocopa shows that matrilocal residence was the popular form for the first few years of married life, after which time the couple lived patrilocally (1977).

Cocopa women wore willow bark skirts until the introduction of cloth by the Spaniards. The men wore loin cloths or breechclouts, which too was

made from cloth pursuant to European contact. As with the Quechan, the Cocopa did not have adequate clothing for the cold seasons, however blankets were known to them for the young men used them in their courting ritual (Kelly 1977).

Like the Quechan and the Kumeyaay, the Cocopa held mourning ceremonies, 'Keruk', for the deceased. Formerly this ceremony, lasting only six days and involving the giving of food and clothing to visitors by the deceased's relatives and also the burning of clothes, was observed only for individuals of prestige. Later it became common for anyone in the tribe to have their death solemnized in this manner (Gifford 1933; Kelly 1977).

The relatives of the deceased were not only required to accumulate clothes and sundry items as gifts for the visitors but they were also required to supply eagle and owl feathers, headresses, deer's-hoof rattle, tobacco, and material for the Keruk structures (Kelly 1977). Accounts of the Keruk ceremony vary to some degree when comparing Gifford's (1933) research with Kelly's (1977) research. Though as Kelly proposes it is most probably due to the state of flux the Cocopa were experiencing during his time of research.

The Cocopa were unlike other Yuman tribes of the Colorado River with respect to political organization. They remained in separate bands with each band having orators and war leaders; they possessed no one single leader within the bands or as a collective group. Kelly (1977) proposes that this distinction between them and their neighbors may have been the result of the U. S. Army influence in 1850. Though one must ask why did this not affect other tribes in the same manner? For whatever reasons the Cocopa were, by the time of Kelly's study in the 1940's, separated into bands, each with not only orators and war leaders by also captains or 'chiefs'. These band leaders or chiefs possessed little authority and maintained no power to implement enforcement of their wishes. All Kelly's sources declared this added leader was the result of Spanish and American influence. These external cultures assigned new leaders to be called captains or chiefs and accompanying the titles were papers of authorization to hold such a position. The office of chief was an inherited position from the male lineage and only held by males. Usually chiefs were succeeded due to their death or resignation; however, chiefs that did not fulfill expected responsibilities could be supplanted by another male of the same lineage (Kelly 1977).

By 1852 a permanent American Army post was established at Fort Yuma, as a consequence traditional life ways were terminated (Kelly 1977).

III. INTERVIEWS

A. THE KWAAYMII (KUMEYAAY): Tom Lucas

The majority of what Tom Lucas discussed during the three hour interview pertained little to the study area specifically, however, it is data that should be accounted for and therefore, will be presented here.

Tom Lucas lived aboriginally in the Laguna Mountains along with the rest of the Kwaaymii, however, today he spends much of his time in Pacific Beach, a coastal community in San Diego.

Mr. Lucas was asked to discuss his knowledge of the Glamis study area as it related to aboriginal use. When queried for his opinion of the potential development of geothermal activity in the area his response was positive because he feels there is nothing in the project area which holds ceremonial or sacred significance. The following is Mr. Lucas's discussion of the Glamis area, specifically and peripherally.

Mr. Lucas stated that there is a spring just north of Brawley. He said that this is the last "water hole between here (part of the trail) and the mountain area (the Chocolate Mountains)". Lucas explained the trails in Lora Clines ethnography "The Kwaaymii" (1979) are not necessarily accurate, and that they only approximate the aboriginal trail systems. He also stated there was a trail south of the trail Cline shows leading from the west side of the Ancient Lake Cahuilla shore line to the east side of this same ancient lake. Mr. Lucas explained this added trail as one that cuts across the "Salton Sink" at a more westerly trend, leading just above the northwest tip of the Sand Hills Sand Dunes and into the southeast tip of the Chocolate Mountains. Mr. Lucas explained that the Kumeyaay main route to Yuma was below the Coyote Mountains and past Signal Mountain. He said it is "near Jacumba where the highway is now, then bears down." He also noted that the "In-Ko-Pah Kumeyaay" take the "south" (main) route to Yuma. When Lucas was asked how long it takes to cross the desert he said it takes "about two or three days to travel from West Mesa to the Colorado River."

Lucas told this researcher that he had worked for sometime with Malcolm Rogers. Apparently Rogers taught Lucas much of what he didn't know about pottery and possibly rock art, and too, other culture groups in the area. Lucas said Rogers located many pottery sherds in the Chocolate Mountains, along with pictographs such as "sun; turtle; baby bird..." He said this is near the Palo Verdes Mountains, explaining these as Kumeyaay sites.

Lucas spoke of trails leading to Obsidian Butte from Harpers Well and then to the Chocolate Mountains. Harpers Well is where they (Kumeyaay) use to meet for the "last invocation" before heading off into the desert. He said the women and children did not travel the desert until the 1700's when they migrated. This migration was explained by Lucas in the following

manner:

> People (Indians) moving into the desert: When Spanish came Don's and land grabbers came in. They're use to having slaves; they took Indians to build adobes for churches and houses. Indians were not use to working. Couldn't take it. They were put to torture. So they migrated to the desert. Before then looked most like stone age. Migration was in early 1700's. Went to the river and Paiute country. When (you) find cremation markings (it symbolizes that) some couldn't take it any longer, so they got sick or (and) died.

While Lucas is not familiar with Indian markings in the Chocolate Mountains he did say that if they are there it would be hard to tell because "just like in other areas (desert mountains and flatlands) they were full of prospectors; because prospectors made trail markers too it is hard" to distinguish prehistoric from historic. This is also true of the Mojave Park area; "there are lots of markings." The "Indians place stones in a row to know where their trail is. Miners pile them but they get scattered after years and it is hard to tell the difference."

Lucas explained that the Utes occupied the same area in the Palo Verdes Mountains as did the Kumeyaay (as previously mentioned). When questioned as to how he could distinguish the two groups he responded by saying "... the soil used for pottery by the Utes was finer, different earth." He explained the Ute migration as having been precipitated by heavy rains coming in from the north causing the Utes to drift in, thus, the two cultures in the same area.

Lucas cited differences in storage patterns between the Kumeyaay and the Utes as the former stored their cache in pottery ollas in the open desert while the latter were untrusting of other groups, and sometimes each other, so they stored their pots with "grains, seeds, mesquite or something of that type in sheltered caves so people would not steal their" caches.

Lucas explained that mesquite was plentiful in the southern portion of the Chocolate Mountains. The "berries (beans) were harvested, then thrashed out, then grinded... made into patties, then baked over. Then they could be carried almost anywhere."

Lucas spoke of Mescal bakes in Mason Valley. He said that "1910 was the last of it."

Lucas was asked to comment on known sources of water and hot springs within and near the study area. He began by discussing the springs that at one time were along the Ancient Lake Cahuilla shore line saying, "but now (they are) submerged with the Salton Sea. They (Indians) use to use the sulpher for fires... back in 1929 I couldn't find (these) springs anymore."

Lucas does not recall any springs in Glamis or the Sand Dunes area. He pointed out on the map Cline (1979) constructed three areas containing springs at one time. One is in the West Mesa Mountains, another below

Fish Creek Mountains, and still another outside the impact range of the Chocolate Mountains.

The following is a story told by Tom Lucas of a man named Peg Leg and his experience with the Cupeno of Warner Springs:

> Before 1850 a man named Peg Leg was taken by the Yuma (Quechan) people to the (southern) edge of Cargo Muchacho Mountains and Sand Hills Sand Dunes and told to walk until the dunes ended. He (Peg Leg) must have seen no end in sight. He wandered around Cargo Muchacho Mountains; found gold. He got the Cupeno to work for him (that is, he went to Warners where the village was and asked them to come back with him). He told the Indians they could not have firearms; they left Warners and camped near Fish Creek; then again they camped north of Mooreland. They had to rest up good, but they weren't sure where they were going and they didn't trust Peg Leg. Since he said no firearms they felt he would kill them after they found the gold for him. So they deserted him. Never went past Mooreland.

Lucas was told this story by "old people whose grandfather traveled that route."

Authors' Note:

When Lucas offered information on the Kumeyaay trail systems, explaining the main Kumeyaay route as the southern trail, which also happens to have been the In-Ko-Pah Kumeyaay route, he meant that the former group (which may be considered a band of Kumeyaay) took the southern route exclusively while other bands living further away from this route would take detours.

Lucas' discussion of the Kumeyaay migration to the desert was prompted by a question asking who traveled through the desert and why? He explained that women and children did not travel until the encroachment of Euro-americans on their territory; coercing cultural changes that were not acceptable to them (Indians). Until that time only the men traveled to the desert.

When Lucas spoke of the Indians prior to the 1700 migration as being "most like stone age", he meant that they were culturally and environmentally pristine; no external influences had affected them.

Vera Brown, an enrollee of the Viejas Indian Reservation and of Kumeyaay extraction, told this researcher during a previous interview that her grandfather, Sam Brown, had a twin brother, now deceased, named Henry Brown. Ms. Brown explained, "when his (Henry's) people would need herbs they didn't have (for medicinal purposes) he would run down to Arizona to get the herbs and bring them back. He would do this all in one day. Henry

also had friends and relatives in Arizona." Ms. Brown did not know which trail Henry took, but one might assume it would have been the southern route mentioned by Tom Lucas.

B. THE QUECHAN: George Bryant and Leroy Ward

George Bryant, a Quechan elder, was asked to comment on concerns for the Glamis project in relation to the potential development of geothermal activity. He told this researcher the only area with which the Quechan express interest is in Pilot Knob. Bryant explained that the Water and Power Resources (formerly known as the Bureau of Reclamation) "worked in the Pilot Knob area; stones were used for construction, right of ways were approved along the Mexican border and the All American Canal." He said "There are petroglyphs in the Pilot Knob mountains and they have been studied by many. These petroglyphs tell stories." Bryant explained there was a "village under the mountain in the Sleepy Hollow area" and that this village has "always been at the foot of the mountains." Bryant further explained that "another village was in existence after the border (Mexican) was" established; this he called the Andreau village. Bryant went on to state another known "village is the Algodones village that was (situated) along the river (Colorado) about 50 miles down and east to the mountains, past Mexicali." Bryant also mentioned the fact that there are Quechan trails "all the way to (the) Parker area (meaning Parker, Arizona)."

Mr. Bryant briefly touched on the origin story of the Quechan. His description is that they "started in Needles (California)." When asked to explain how he learned of this story he answered "this knowledge was passed to me by songs and stories from my grandparents." He explained that after the Quechan's beginning in Needles they and others dispersed after years, "going different ways."

Mr. Bryant did not know of any Quechan travels passed the dunes area, though he "thinks they did."

Prior to making contact with George Bryant, this researcher spoke with another respected Quechan individual by the name of Leroy Ward. Mr. Ward spoke of the Quechan travels explaining that the Quechan once traveled from "Arizona to Ocotillo, to San Bernardino, to Gila, then to the Mexican border." He mentioned that the Quechan, Maricopa, Mojave, and Chemehuevi were at one time all one group of people, but then the "clans were scattered; they all moved and established themselves as they are today." Mr. Ward said that while the Quechan did much traveling he did not believe the area of concern for the present project holds ceremonial or sacred significance for the Quechan.

Neither George Bryant nor Leroy Ward were adverse to the potential development of geothermal activity within the proposed area, except, of course,the southern portion of the mountains in Pilot Knob; however, this area appears to be outside the project boundaries.

Authors' Note:

It is surprising Leroy Ward should include the Chemehuevi in the

Quechan origin story for they are of the Uto-Aztecan language stock and, therefore, linguistically distinct from the Yuman speakers. The fact that the Chemehuevi were allies of the Quechan and the Mojave and their culture, in many respects, was very similar to Mojave could be cause for their inclusion, by Mr. Ward, in the Quechan origin story.

The village site Mr. Bryant referred to as one that has been partially impacted by the Water and Power Resources is said to be located on the southern extension of the Pilot knob Mesa, at the base of the mountains.

C. The Cocopa: Pete Soto

The Cocopa Indian Reservation in Somerton, Arizona, was contacted and this researcher spoke with the Tribal Chair, Paul Soto. Mr. Soto was queried on Cocopa occupation/utilization of the Glamis area, in the past or present. Mr. Soto responded by saying that the Cocopa did not really travel through the area in question; that they were more in Arizona and Mexico.

Pete Soto (Paul's brother) is an enrolled member of the Somerton reservation though he resides in Phoenix, Arizona where he is currently employed with the Bureau of Indian Affairs. Mr. Soto was contacted on several occasions to discuss the possible existence of the Cocopa within and near the study area. Soto, after discussing the matter with "some of the elders" of the reservation, explained, his "preliminary findings show that areas in the Chocolate Mountains and also near the Salton Sea" were exploited by the Cocopa. Mr. Soto further explained there "is more on the way and when the elders send" him the information he, in turn, will send it to this researcher.

Authors' Note:

To this date no further data has been received from Pete Soto, however, because the areas suggested for use by the Cocopa are not within the present study boundaries the lack of data should not bear heavily on this report.

It should be mentioned, to substantiate Pete Soto's statement of the Cocopa in California, that Paul Soto noted there "were excursions (by the Cocopa) through that area (project are); however, at this time we know of nothing" sacred or significant having transpired or existing.

IV. RESEARCH CONCLUSIONS

Upon completion of the interviews it was evident the study area, Glamis/Sand Hills, was utilized for nothing more than access to a destination outside the project boundaries.

Tom Lucas described a travel route that appears to bisect the study area between the town of Glamis and Pilot Knob Mesa; however, he noted the last "water hole" was north of Brawley, and most often this area (between Glamis and Pilot Knob) was traversed quickly with only overnight camping. This information is congruent with Wirth Associates' report on Cultural Resource Locations (April 1979). Clyde Woods, Consulting Anthropologist for Wirth Associates, was questioned for referenced leading to the information retrieved for the Glamis area for the previously cited Wirth project. Woods explained the research "was only archival", not field for he "couldn't locate anyone familiar with the area." The archival research produced two site descriptions; one hunting, the other camping.

None of the individuals interviewed contested the potential development of geothermal activity within the project area; however, were geothermal activity to be developed within the project boundaries this researcher recommends the following: A public review period be implemented whereby anyone adverse to geothermal development may express cause for contestation of geothermal development.

V. PERSONS AND AGENCIES CONSULTED

Anita Williams
Ethnographer

California Indian Legal Services
Forrest Wright

United States Department of Interior
Desert Planning, Riverside
Robert Laidlaw, Ethnographer

Vincent Harvier
Tribal Chairman, Quechan Indian Reservation

Wirth Associates
Clyde Woods

VI. BIBLIOGRAPHY

Bee, Robert L.
1970 Self-help at Fort Yuma: A Critique. Human Organization, 29: 155-161.

Chittenden, N. H.
1901 Among the Cocopahs. Land of Sunshine, 14:196-204.

Cline, Lora L.
1979 The Kwaaymii: Reflections of a Lost Culture. Occasional Paper No. 5 IVC Museum Society.

Dobyns, H. F. et. al.
1957 Thematic Changes in Yuman Warfare. In Verne F. Ray (ed.) Cultural Stability and Change. Seattle.

Drucker, Philip
1941 Culture Element Distributions: XVII Yuman-Piman. Berkeley California University Publications, Anthropological Records 6, No. 31.

Emerson, Lee
1971 Petroglyphs of Ancient Man: A Quechan Man Speaks. Indian Historian 4 No. 1:4-8.

Forbes, J. D.
1965 Warriors of the Colorado. University of Oklahoma Press. Oklahoma, U.S.A.

Gifford, Edward W.
1918 Clans and Moieties in Southern California. University of California Publications in American Archaeology and Ethnology 14:155-219.

1931 The Kamia of Imperial Valley. Bureau of American Ethnology Bulletin 97. Washington, D,C,

1933 The Cocopa. California University Publications in American Archaeology and Ethnology 31:257-334.

Harrington, John P.
1908 A Yuma Account of Origins. Journal of American Folklore 21:324-348.

Kelly, William H.
1977 Cocopa Ethnography. Anthropological Papers of the University of Arizona No. 29. University of Arizona Press, Tucson, Arizona.

Kroeber, A. L.
1920 Yuman Tribes of the Lower Colorado. California University

Publications in American Archaeology and Ethnology, 16:475-482.

1925 Handbook of the Indians of California. Bureau of American Ethnology Bulletin 78. Washington, D.C.

Luomala, Katherine
1963 Flexibility in Sib Affiliation Among the Diegueno. Ethnology 2:282-301.

1978 Tipai-Ipai. Handbook of North American Indians Vol. 8:592-618. Washington, D.C. Smithsonian Institution.

May, Ronald V.
1974 A Brief Survey of Kumeyaay Ethnology: Correlations Between Environmental Land-Use Patterns, Material Culture, and Social Organization. Pacific Coast Archaeological Society Quarterly Vol. 11 No. 4:1-25.

9/20/79

RECEIVED
BUR OF LAND MGMT
SEP 21 10 00 AM '79
DISTRICT OFFICE
RIVERSIDE, CA.

Riverside District Office
Bureau of Land Management
Russell Kaledenberg

Dear Mr. Kaldenberg:

The following is a progress report on the Glamis ethnographic investigation.

Interviews with individuals from Cocopa and Quechan heritage will be set up for late October or early November. Tom Lucas and the Kumeyaay will be interviewed within the next four or five weeks.

Peter Soto (Quechan) was referred to me by Anita Williams, a woman who's conducted ethnographic studies with the Quechan and the Cocopa in Baja. Evidently Mr. Soto knows several people that may have knowledge concerning use of the study area by Lateprehistoric and historic people.

Merko Flack resides at the Pala Rey Camp in San Diego county, near the Pala Indian Reservation. He is of the Diocese of San Diego and has worked at Pala Indian Reservation for many years. Merko Flack is familiar with the people on Pala and will introduce me to the Kumeyaay from San Felipe-Hopefully they will know of peoples travels through the study area.

Tom Lucas is Kwaaymii, residing in Laguna. Lora Cline's "Reflections on a Lost Culture" gives a travel route which appears to be very close to Glamis.

Ethnography

I. Discuss geothermal development*
   a. potential hazards
   b. advantages
II. Discuss sensitive areas
   a. ceremonial
   b. traditional
   c. sentimental
III. Discuss trade and travel
   a. social networks

It has been my experience that any one interview will present leads for other knowledgeable individuals to be interviewed.

*If the consulting Native Americans ask questions concerning the processes of geothermal development a discussion such as outlined in I will transpire.

You should receive a second progress report in four to five weeks.

Very truly yours,
Paige Talley
Paige Talley

RECON
Regional Environmental Consultants
1094 Cudahy Place, Suite 204, San Diego, CA 92110 (714) 275-3732

RECEIVED
APR 1 10 00 AM '80
RIVERSIDE, CA.

March 31, 1980

Russell Kaldenberg
1695 Spruce Street
Riverside, CA 92507

Dear Russ,

I am sorry this is not the report I promised you but I am still experiencing delays with the Indians. Pete Soto, a Cocopah working with the BIA in Phoenix, Arizona, has informed me that his people traveled through the project area into the Chocolate Mountain Range and on to the Salton Sea. He expressed to me that these are his "preliminary findings" and that a more detailed report is to be sent me.

Tom Lucas spoke of travel routes through the project area however, he expressed no concern over the development of geothermal activity for there is nothing as far as he knows that is of sacred or ceremonial significance in this area.

The Quechan have been rather difficult however, I did obtain some information from George Bryant via telephone. He informed me that the Pilot Knob area "just below the mountains" is highly significant to them because it was once a Quechan village. He said while they traveled through the Glamis area it holds no particular significance for them and therefore they are not adverse to the development of geothermal activity north of Pilot Knob (within the project area).

The Mojave have yet to comment.

Please accept my apologies for the delay as this is not a pattern with my work. I will hurry the Indians and the report along as fast as I can.

Very truly yours,

Paige E

Paige Talley

ATTACHMENT 3

BLM CALIFORNIA DESERT PROJECT

ARCHAEOLOGICAL SITE SURVEY RECORD

[1] County	
[2] District	
[3] Planning Unit	
[4] Sample Unit	
[5] Photos	
[6] Date	
[7] Recorder	

[8] Site # _____ [9] Other # _____

[10] Site Name _____

[11] Cadastral Location: Twn ____ Rng ____ ____ of ____ of Sec ____

[12] Quadrangle _____ [13] Elevation _____

[14] UTM Grid Loc. Zone _____ Northing _____ Easting _____

[15] Reference Points: _____

[16] OWNER

- BLM
- OTHER FED.
- STATE
- PRIVATE
- UNKNOWN

[17] NAT'L REGISTER

(A) STATUS

- LISTED
- CNDIDATE
- POTENTIAL
- NOT ELG.
- NO DET.

(B) TYPE

- DISTRICT
- SITE
- OTHER

[18] DISTURB

- DEVELOPMENT
- ANIMAL
- VANDALISM
- ORV
- OTHER

[19] CNDT

- GOOD
- FAIR
- POOR

[20] COMMENTS

[21] SITE TYPES

- VILLAGE
- TEMPORARY CAMP
- SHELTER/CAVE
- MILLING STA.
- LITHIC SCATTER
- QUARRY SITE
- POTTERY LOCUS
- CEMETERY
- CREMATION LOCUS
- INTAGLIO
- ROCK ALIGNMENT
- PETROGLYPH
- PICTOGRAPH
- TRAIL
- ROASTING PIT
- ISOLATED FIND
- CAIRN
- HISTORIC
- OTHER

[22] AREA

- 0-10 Sq. M.
- 11-50
- 51-250
- 251-1000
- 1001-5000
- over 5000

[23] DEPTH

- SURFACE
- 1-20 Cm.
- 21-100
- over 100
- UNKNOWN

[24] General Site Description:

[25] FEATURES

- STRUCTURAL DEP.
- ROCK RING
- ROCK STRUCTURE
- CAIRN /SHRINE
- ROASTING PIT/PAR
- HEARTH
- PETROGLYPHS
- PICTOGRAPHS
- BEDROCK MORTAR
- GRINDING SLICK
- OTHER

[26] ARTIFACTS

- PROJECTILE POINT
- FLAKED STONE TOOL
- CORE-DETRITUS
- MILLING TOOL
- OTHER GROUND STONE
- CERAMIC
- BONE
- PERISHABLE
- ORNAMENT
- HISTORIC
- OTHER

[27] ECO.

- FIRE AFFECTED ROCK
- FAUNA
- FLORA
- OTHER

[28] MAT.

- CRYPTOCRYSTALLINE
- OBSIDIAN
- FELSITE
- OTHER

[29] Describe:

[30] VEGETATION

- BARREN
- SALTBUSH
- CREOSOTE
- JOSHUA/CREOSOTE
- JOSHUA/YUCCA
- YUCCA/CACTUS
- BLACKBRUSH
- SAGEBRUSH
- PINYON/JUNIPER
- CONIFER
- SHADSCALE
- CHAPARRAL
- OAK WOODLAND
- MESQUITE
- RIPARIAN
- WASH
- GRASSLAND
- OTHER

[31] COVERAGE

- CONTINUOUS (over 75%)
- INTERRUPTED (50-75%)
- PARK-LIKE (25-50%)
- RARE (6-25%)
- BARELY PRESENT (1-5%)
- ABSENT (0-1%)

[32] WATER

- INTERMITTENT STREAM
- PERMANENT STREAM
- SPRING
- PLAYA
- OTHER

[33] Describe

[34] LANDFORM

- MOUNTAIN
- HILL
- TERRACE
- RIDGE
- ALLUVIAL FAN
- CANYON
- ARROYO
- SAND DUNE
- DESERT PAVEMENT
- BADLANDS
- PLAYA
- OTHER

[35] BEDROCK

- EXTRUSIVE IG.
- INTRUSIVE IG.
- METAMORPHIC
- SEDIMENTARY
- QUATERNARY ALLUV.
- OTHER

[36] TEXTURE

- SAND
- LOAM
- SILT
- CLAY
- OTHER

[37] SOILS

- MIDDEN
- ALLUVIAL
- COLLUVIAL
- EOLIAN
- BEDROCK
- OTHER

[38] Describe

[39] SLOPE

- POINT OF INFLEX
- LOWER 1/3
- MID 1/3
- UPPER 1/3
- 0-5°
- 6-15°
- 16-30°
- 31-60°
- over 60°

[40] ASPECT

- NORTH
- NORTH/EAST
- EAST
- SOUTH/EAST
- SOUTH
- SOUTH/WEST
- WEST
- NORTH/WEST

[41] EROSION

- DEFLATION
- RILLING
- GULLYING
- SHEET/WASH
- ROCK/DEBRIS
- SLUMPING
- OTHER

[42] DRAIN.

- CONVERGING
- DIVERGING
- BRAIDED
- OTHER

[43] Remarks

BLM CALIFORNIA DESERT PROJECT

ARCHAEOLOGICAL SITE SURVEY RECORD

(Continuation Sheet)

[8] Site # _____ [9] Other # _____

[10] Site Name _____

[1]	County
[2]	District
[3]	Planning Unit
[4]	Sample Unit
[5]	Photos
[6]	Date
[7]	Recorder

CALIFORNIA DESERT PROGRAM
ARCHAEOLOGICAL SAMPLE UNIT RECORD

1. Planning Unit _____ 2. Sample Unit _____ 3. Date _____

4. Twp. _____ Range _____ Section _____ 5. Map _____

6. General Location:

7. Vegetation:

8. Fauna:

9. Geology/Geomorphology:

pyroclastic.

10. Hydrology:

11. Weather Conditions:

12. Sites Recorded:

Isolated features:

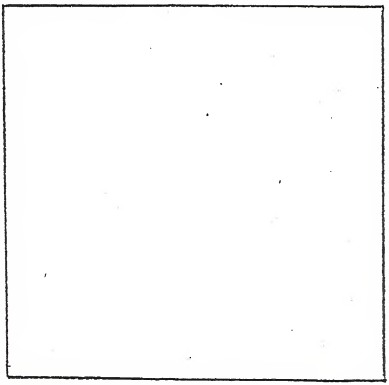
13. Duration of Survey:

14. Survey Crew:

Recorder: _____

15. General Interpretations & Comments (Attach additional pages as necessary):

16. Sketch Map of Sample Unit Indicate: a) Dimensions of sample unit; b) Pertinent or prominant land forms; c) Survey pattern, including approximate area covered and portion of unit covered by individual crew members; d) Location of sites recorded.



TRANSECT REPORT

CONTINUATION

15. General Interpretations & Comments

BLM CALIFORNIA DESERT PROJECT
HISTORIC SITE SURVEY FORM

County	
District	
Planning Unit	
Sample Unit	
Photos	
Date	
Recorder	

1. Site Number _____ 2. Site Name _____
3. Other (numbers/names) _____
4. Location: Twn ____, Rng ____, ____of ____, of Sec ____, Quad _____, Elev _____

Reference Points: _____

UTM Grid Loc: Zone _____ North _____ East _____

5. Ownership: BLM __, Other Federal __, State __, Private __, Unk __
6. National Register Status: Candidate __, Potential __, Determined not Elgible __, No Determination __,
7. Disturbance: Animal __, Burning __, Vandalism __, ORV __, Other __, Explain _____
8. Present Condition: Good __, Fair __, Poor __, Explain _____
9. Activity: Mining __, Railroad __, Military __, Homesteading __, Exploration/Traveling __, Settlement __, Ranching __, Other __, Explain _____
10. Site Type: Town __, Camp X, Homestead __, Road __, Trail __, Mine __, Railroad __, Graveyard __, Trashdump __, Military __, Other _____
11. Features: Structure __, Dugout __, Fire Hearth __, Cairn __, Rock Alignment __, Trashdump __, Irrigation __, Trail __, Road __, Corral __, Burial __, Well __, Spring __, R&R Grade (berm) __, Tram (road/way) __, Tailings __, Other __, Explain _____
12. Artifacts: Wood (size,type) __, Glass (color) __, Metal (type) __, Bone (species) __, Ceramic (color) __, Adobe (condition) __, Nails (size,type) __, Cans (size,type) __, Ordnance __, Other___, Explain _____
13. Temporal Period: Circa _____, Era _____

(continue on reverse side, refer by number)

ATTACHMENT 4

A. PREHISTORIC SITE TYPES

01 Village - This site type represents long-term or seasonal activity, usually identified as a village or base camp. A village would be identified archaeologically by primary and secondary tools (that is, tools used in the manufacture of other tools) and a variety of other artifacts, as well as floral and faunal remains which represented subsistence activities. Such a site would be characterized by extensive scatters and quantities of debris such as potsherds, fire-affected rock, whole and broken flaked stone tools, chipping waste, charred bone, milling tools, house structures, hearths, rock rings, and sometimes rock art or burials and cremations. A well developed midden is usually a component of this site type.

02 Temporary Camp - Temporary camps are sites that were occupied for a short length of time (e.g., one day to one month) by a few people (from an individual to several families). These sites can be identified archaeologically by scattered artifacts, tool manufacturing debris, fire-affected rocks and possibly features. They differ from the first site type by size and frequency of cultural remnants. This type is somewhat a catch-all category. It includes sites that reflect a range of artifacts and/or cultural features that in combination do not allow the site to be typed in another category (e.g., pottery with flakes). The inferred function of the site is limited camping (i.e., limited subsistence and maintenance activities). However, an open site with any combination of flaked stone artifacts, ground stone, fire-affected rocks, and/or ceramics could fit in this site type.

03 Utilized Shelter or Cave - This site type represents archaeological sites found exclusively in rockshelters caves or under rock overhangs. If only rock art is present then the site is typed as 12 or 13. Three sub-types have been identified. These are as follows:

03a Occupation Rockshelter - This sub-type represents temporary or seasonal occupation locations containing cultural debris similar to that described for village locations (01) or temporary camps (02).

03b Transient Rockshelter - Rockshelter or overhang indicative of extremely limited use. The inferred use is that of overnight camping enroute to other locations. These sites are usually along an aboriginal trail or route of travel. Cultural remains may consist only of an isolated tool or a few flakes and possibly some fire-affected rocks. Absent from this type is a developed midden.

03c Storage Rock Shelter - Rockshelter or overhang, usually small in size, containing only basketry, pottery, or other cultural remains indicative of storage activities. This would include tool or food caches.

04 Milling Station - This site type is a manifestation of procurement and/or processing of hard (e.g., chia) and/or soft (e.g., acorn) seeds and other food items. Associated artifacts may include manos, metates, mortars or pestles. Bedrock mortars or bedrock metates (e.g., grinding slicks or rubs) may be present. This site type may consist of an isolated metate or a single bedrock metate or any combination of

artifacts or features indicative of milling activities. Associated with this site type may be an occasional flake or flaked stone tool.

05 Lithic Scatter - These sites are characterized exclusively by the presence of flaked stone tools, chipping waste, cores, retouched and utilized flakes, and/or flake material such as chalcedony, chert, jasper, opal, rhyolite, or obsidian. Other cultural material is absent. Since this general site type often constitutes a major percentage of the archaeological site inventory, five sub-types are used here to allow a closer assessment of this type's variability.

From the existing site record sheets, only the variables of 1) area and 2) density or quantity of flaked stone material present can be determined with any regularity. Giving two characteristics to each of the major variables, four combinations are possible.

The characteristics for area are simply 1) large, and 2) small. Large is considered to be greater than 50 square meters. Small is considered to be less than 50 square meters.

For density of quantity, the characteristics are 1) high, and 2) low. The determination of the characteristics is dependent on key terms used on the site record sheet or on the number of artifacts observed.

A high density is determined if terms such as "dense," "heavy," "thick," "numerous," "a wide variety," etc., are used in reference to quantity of flakes and/or flaked stone tools present. If only the number or a listing of flakes and/or flaked stone tools observed is given then a rough assessment of artifacts per ten square meters is made. Generally, an estimate of an average of more than 30 flakes and/or flaked stone tools per ten square meters is considered high.

A low density is determined if terms such as "thin," "few," "light," "small number," etc., are used in reference to quantity of flakes and/or flaked stone tools present. If only the number or a listing of flakes and/or flaked stone tools observed is given then a rough assessment of artifacts per ten square meters is made. Generally, an estimate of an average of less than 30 flakes and/or flaked stone tools per ten squre meters is considered low.

The four combinations of area and density are shown as follows:

		DENSITY (+) High	DENSITY (-) Low
Area	Large (+)	A + +	B + -
	Small (-)	C - +	D - -

The fifth sub-type, Chipping Circle, is a distinct archaeological feature which when occurring without other flaked stone material or flaked stone tools is recorded as an archaeological site.

The five sub-types of Lithic Scatters are briefly described as follows:

05a Large, Dense Lithic Scatter - A locus consisting of a high density of flakes and/or flaked stone tools over a large area (i.e., high density and large area).

05b Large, Light Lithic Scatter - A locus consisting of a low density of flakes and/or flaked stone tools over a large area (i.e., low density and large area).

05c Small, Dense Lithic Scatter A locus consisting of a high density of flakes and/or flaked stone tools over a small area (i.e., high density and small area).

05d Small, Light Lithic Scatter - A locus consisting of a low density of flakes and/or flaked stone tools over a small area (i.e., low density and small area).

05e Chipping Circle A loci consisting simply of a core with related flakes immediately around it. Occasionally, flakes from the core evidence possible utilization. Hammerstone(s) may on occasion be found in association. A "chipping circle" is usually only one or two meters in diameter. A cluster of chipping circles (i.e., two or more) may be considered a single site if they are less than 20 meters apart and more than 100 meters from another site. Occasionally, an isolated flake or flakedstone tool may be found in the vicinity of a chipping circle. If a chipping circle is associated with other flakes and/or flaked stone tools, or if it is part of a larger site, then another site type or sub-type is utilized.

06 Quarry - A quarry site is a location where lithic material has been extracted from a larger mass (usually crypto-crystalline), such as a seam, vein or outcrop, for the purpose of tool manufacture. Such sites are characterized by an abundance of flakes, cores, occasional hammerstones, preforms, blanks or rejects.

07 Pottery Scatter - This type of site is represented by surface scatters of pottery (ceramic) sherds or broken vessels. No other artifacts or features are present.

08 Cemetery - Prehistoric locations for human internment comprise this site type. Surface indications may include cairns, exposed bone, mounding or markers. This site type ranges from isolated burials in shallow holes to extensive cemeteries.

09 Cremation Locus - A special type of internment is the cremation. Charred human bone fragments may occasionally be found in small cavities in the rock, in dune areas, in utilized shelters or caves, or as part of camps or villages.

10 Intaglio - These are large figures produced on desert pavement surfaces in the form of animal, human, and geometric designs. Their distribution is usually limited to areas along the lower Colorado River or Yuha Desert but isolated occurrences in other areas have been noted.

11 Rock Alignment - Prehistoric alignments of cobbles and boulders occur in the California Desert. Such alignments vary in size and complexity ranging from simple lines to complex abstract or geometric designs.

12 Petroglyph Site - Petroglyphs represent pecked or incised figures or designs on boulders, rock outcrops or shelter walls.

13 Pictograph Site - Pictographs are painted figures or designs which occur most frequently on the walls of sheltered caves, boulders or outcrops. The most frequent colors are red, black and white although other colors such as orange, brown, yellow and green can occur.

Note: If both petroglyphs and pictographs are present then the dominate rock art form (i.e., greatest number of elements) dictates the site type to be given (e.g., petroglyph site with pictographs or pictograph site with petroglyphs.) The lesser rock art form (i.e., smallest number of elements) is recorded as a cultural feature.

14 Trail - Trails are marked routes of travel between permanent villages, temporary camps, and resource procurement areas. Where they survive, trails usually are faint linear impressions or clearings in the desert pavement or slight "shelves" along hillsides and canyon slopes. Potsherds and other artifacts may occur along trails, as might rock cairns or trail shrines. However, the trail is an entity in itself--a route of travel interlinking the various activity areas and sites of the aboriginal populations.

15 Roasting Pit - This site type encompasses the range of rock features which includes earth ovens, roasting pits and clusters of fire affected rock. This category is used when there is an absence of other cultural remains.

16 Isolated Find - An occurence of a single artifact or cultural features that does not conform to other site types are documented with this category. This includes isolated flaked stone tools, cores, manos, and other artifacts not covered by other site types (e.g., an isolated metate is included in 04). Cultural features included in this site type are single rock rings or single sleeping circles with no associated artifacts or other cultural features.

17 Cairn - Mounding of cobbles and/or boulders are found in the California Desert. These are referred to as rock cairns. Sometimes cairns mark trails, shrines, or burials. Cairns can appear singularly or in clusters.

B. HISTORICAL SITE TYPES. For purposes of this section, historic sites are defined as loci of past activity or activities of Hispanic and Euro-American populations. It includes sites documented in the historic record (i.e., diaries, historic accounts, andother historic documents) and sites for which no written record or reference can be found. The historic period in the study area dates back to 1776. At the other end, a site is normally considered "historic" if it is 40 years or older. However, more recent sites that have maintained historical integrity (e.g., homesteads) or are associated with a significant event or activity (e.g., WW II training camps) may also be included.

More than two dozen historical site types have been identified in localized areas within the California desert. These site types can be placed into five cultural categories which are indicative of general activities. These cultural categories or general activities are 1) Exploration, 2) Settlement 3) Military, 4) Mining, and 5) Transportation.

1. Exploration involves historical sites associated with early expeditions, explorations, immigrations, and government surveys. Sites associated with this category are simply campsites and routes of travel.

2. Settlement includes those sites indicative of living activities and maintenance activities associated with settlement. Sites within this category include town, hamlet, mining camp, dug out, homestead, farm, ranch, school, cemetery, well, trash dump, and other structures associated with settlement.

3. Military encompasses remnants of past military activities. Sites of this category are fort, camp, outpost, redoubt, and World War II training camp.

4. Mining is a category to cover activities specifically related to the extraction and processing of locatable, salable and/or hardrock minerals. Sites included in this category are mine, shaft, addit, tunnel, mill, arrastre, and mining works.

5. Transportation deals with historical sites that were involved with public conveyance of passengers and/or goods, especially for a commercial enterprise, and sites directly related to this activity. Sites within this category are pack trail, wagon road, stage route, early automobile road, railroad, railroad station and water stopovers.

The various site types are briefly described as follows:

01 Town - A compactly settled area usually larger than a hamlet.

02 Hamlet - A small settlement.

03 Mining Camp - A settlement associated specifically with mining activities. This is also indicative of much more transient use than either 01 or 02.

04 Homestead - A tract of land acquired from U.S. public lands by filing a record and living on and cultivating the tract.

05 Farm - A plot of land devoted to the raising of crops.

06 Ranch - A plot of land devoted to the raising of beef cattle and/or other livestock.

07 Railroad Station - The building, remains, and/or regularly scheduled stopping place of the train for the purpose of loading and unloading passengers and freight.

08 Post Office - A building and/or site once officially designated as a local branch of the U.S. Post Office.

09 School - A building used for educational instruction.

10 Structure - Something that is constructed (e.g., building) of rock, adobe, wood, or a combination of these materials or other material.

11 Fort - An official U.S. military designation for a permanent army post that is occupied continuously by troops.

12 Camp (1800's) - The lowest official U.S. military designation for an army post that is usually small but has a permanent detachment of men assigned to it.

13 Camp (WW II) - An official military post consisting mostly of tent structures and established as a base of operation for World War II training manuevers.

14 Outpost - An unofficial military designation used in the 1860's to identify a temporary post to which a small detachment of men (usually a non-commissioned officer and 3-10 enlisted men) from a regional camp were temporarily assigned.

15 Redoubt - A small, usually temporary, enclosed defensive work.

16 Mine - A pit or excavation in the earth from which mineral substances are taken.

17 Shaft - A vertical or inclined opening of uniform and limited cross section made for finding or mining ore.

18 Addit - A horizontal opening of uniform and limited cross section made for finding or mining ore.

19 Tunnel - A horizontal passageway through a ridge, hill or mountain and associated with mining activities.

20 Arrastre - A devise built to grind gold-bearing quartz. The early types consisted of a low stone and dirt wall built around a large and fairly level stone, hard pan or flat rock-lined floor.

A long horizontal beam was pivoted on a vertical post in the arrastre's center. One end of the beam was harnessed to a burro or mule to provide necessary power by walking in a circle outside the low arrastre wall. A heavy chain was fastened to the beam about midway, and the free end of the chain linked to a ring bolt wedged in a heavy drag stone(s).

21 Ore Mill - A site where crushing machinery, usually steam engine powered, was used to pulverize ore-bearing rock to facilitate the extraction of gold and/or other metals. Five- and ten-stamp mills were most common.

22 Mining Works An area where mining and/or processing works (e.g., flumes, chutes, sorters, etc.) are present.

23 Dug Out - A shelter dug in a hillside or dug in the ground and roofed with sod or earth.

24 Railroad - The remains of a permanent road having a line of rails fixed to ties and laid on a roadbed or berm and providing tracks for railroad cars.

25 Automobile Road (Early) - Road used for early automobile travel (e.g., Model-T, etc.).

26 Wagon Road - Route habitually used by wagons pulled by draft animals.

27 Stage Route - Trail utilized regularly by the stagecoach companies for handling passengers and mail.

28 Pack Trail - Historic foot and pack animal (horse and mule) route of travel that was not used by wagons.

29 Exploration Route - Routes taken by early expeditions, explorers, travelers, and survey parties. Also included are routes used for domestic livestock drives.

30 Cemetery - A place with historic human interments associated with Euro-American activities (i.e., a historic burial ground).

31 Trash Dump - A place where refuse or other discarded materials are accumulated or dumped.

32 Well - A deep hole or shaft sunk into the earth to tap an underground supply of water.

33 Railroad Water Stop - A place along a railroad right-of-way where trains periodically stopped to take on water.

34 Isolated Find Singular occurance of a historic artifact such as the following:

Bottle
Stirrup
Horseshoe

Road grader

ATTACHMENT 5

ATTACHMENT 5
SITE LISTING BY TYPE

TRANSECT #	SITE #	ZONE	SITE TYPE	DESCRIPTION	SIZE	ELEVATION
001	02	GLAMIS	13	HEARTH/CIRCULAR DEPRESSION		300
001	01	GLAMIS	16	POT SHERD	N.A.	310
002	02	GLAMIS	34	CIRCULAR DEPRESSION		350
002	03	GLAMIS	34	MILITARY CAMP	40	320
002	01	GLAMIS	34	HEARTH		335
007	01	GLAMIS	13	FOXHOLE/BOOT SOLE		300
008	01	GLAMIS	13	FOXHOLE/AMMUNITION SHELLS		370
009	01	GLAMIS	13	MILITARY CAMP	5000	470
011	02	GLAMIS	31	HISTORIC DUMP		595
011	01	GLAMIS	13	BOMB CRATERS		595
012	02	GLAMIS	14	ABORIGINAL TRAIL W/SHERDS	<1000	620
012	01	GLAMIS	02	SLEEPING CIRCLE/ROCK RING	.45	620
012	04	GLAMIS	16	CHALCEDONY FLAKE	N.A.	630
012	03	GLAMIS	16	CHERT FLAKE	N.A.	630
014	01	GLAMIS	16	CHERT HAMMERSTONE	N.A.	630
015	01	GLAMIS	05	LITHIC SCATTER	1.00	395
016	01	GLAMIS	34	HEARTH/MODERN		442
017	01	GLAMIS	13	HEARTH W/CANS		480
017	02	GLAMIS	34	FURROWS		N.A.
018	02	GLAMIS	31	DUMP W/CANS	5	540
018	03	GLAMIS	34	CAMPFIRE		545
018	01	GLAMIS	34	CAMPFIRE		520
018	04	GLAMIS	13	CAMPFIRE (FOXHOLE?)		540
018	05	GLAMIS	34	CAMPFIRE		515
019	01	GLAMIS	13	FOXHOLE W/CANS		570
019	04	GLAMIS	13	CONCENTRATION OF CANS		570
019	05	GLAMIS	13	ROCK ALIGNMENT		570
019	02	GLAMIS	13	LARGE CAMPSITE		580
019	03	GLAMIS	13	FOXHOLE W/CANS		590
022	02	GLAMIS	13	RUNWAY		345
023	03	GLAMIS	07	POT SHERD SCATTER	6.00	340
023	03	GLAMIS	34	HEARTH		370
023	01	GLAMIS	34	HEARTH		365
023	05	GLAMIS	34	HEARTH		362
023	02	GLAMIS	34	HEARTH		368
023	04	GLAMIS	34	HEARTH		375
024	01	GLAMIS	13	FOXHOLE W/CANS		420
024	02	GLAMIS	18	SLEEPING CIRCLE	6.00	420
025	03	GLAMIS	34	U SHAPED FURROW	1	415
025	01	GLAMIS	34	HEARTH		485
025	02	GLAMIS	34	HEARTH		478
026	06	GLAMIS	34	NAMES SPELLED IN QUARTZ		510
026	05	GLAMIS	13	FOXHOLES		490
026	02	GLAMIS	34	HEARTH W/GLASS		510
026	08	GLAMIS	34	FURROWS		615
026	04	GLAMIS	18	SLEEPING CIRCLES	N.R.	N.R.
026	07	GLAMIS	34	HEARTH		510
026	03	GLAMIS	34	HEARTH (ROCK RING) W/METAL		500
026	01	GLAMIS	34	HEARTH W/CANS		530
028	01	GLAMIS	30	CHINESE GRAVEYARD (1878)		335
030	06	GLAMIS	34	SMALL DEPRESSION		410
030	05	GLAMIS	16	CHERT TOOL	N.A.	385
030	01	GLAMIS	13	TENT CLEARINGS		415
030	02	GLAMIS	34	CIRCULAR DEPRESSION		425

ATTACHMENT 5
SITE LISTING BY TYPE
(continued)

TRANSECT #	SITE #	ZONE	SITE TYPE	DESCRIPTION	SIZE	ELEVATION
						390
030	04	GLAMIS	13	U SHAPED CRATER		405
030	03	GLAMIS	34	HEARTH		485
031	01	GLAMIS	13	CLEARED RECTANGLES		505
031	03	GLAMIS	34	CAMPFIRE CAVE W/GLASS		510
031	02	GLAMIS	13	HEARTH CLEARED SQUARES	N.A.	450
032	01	GLAMIS	16	POT SHERD		420
032	02	GLAMIS	31	SCATTERED CANS		480
033	02	GLAMIS	13	CANS FOXHOLE		460
033	03	GLAMIS	13	SEMI CLEARED AREAS	27.00	480
033	04	GLAMIS	02	SLEEPING CIRCLES (9) W/LITHICS		490
033	01	GLAMIS	34	DEPRESSION		420
034	03	GLAMIS	34	CHARCOAL CONCENTRATION		430
034	07	GLAMIS	13	TENT RECTANGLE		430
034	05	GLAMIS	34	CHARCOAL CONCENTRATION	N.R.	N.R.
034	06	GLAMIS	18	SLEEPING CIRCLES (2)		405
034	09	GLAMIS	13	CAMPFIRES		395
034	01	GLAMIS	13	MILITARY		415
034	08	GLAMIS	13	HISTORIC DUMP		425
034	04	GLAMIS	34	HORSESHOE		410
034	02	GLAMIS	34	CHARCOAL CONCENTRATION	N.A.	N.R.
037	07	GLAMIS	16	CHALCEDONY CORE	N.A.	360
038	01	GLAMIS	16	CHERT FLAKE		400
039	08	GLAMIS	13	FOXHOLES (7)	N.A.	400
039	05	GLAMIS	16	POT SHERD		400
039	03	GLAMIS	34	CHARCOAL HEARTH		400
039	07	GLAMIS	13	U.S. ARMY BUTTONS	N.A.	400
039	02	GLAMIS	16	JASPER FLAKE		400
039	04	GLAMIS	34	HEARTH W/CANS	N.A.	400
039	06	GLAMIS	16	CHERT FRAGMENT		360
039	01	GLAMIS	34	TELEPHONE POLES		420
040	04	GLAMIS	13	FOXHOLE	560.00	438
040	02	GLAMIS	07	POT SHERD SCATTER/HEARTH	N.A.	438
040	01	GLAMIS	16	FLAKE (POSSIBLE)	N.A.	438
040	03	GLAMIS	16	CHALCEDONY CORE		430
041	01	GLAMIS	31	CAN SCATTER BOTTLES		450
041	02	GLAMIS	34	CHARCOAL CONCENTRATION	N.A.	460
042	01	GLAMIS	16	CHALCEDONY FLAKE		460
042	02	GLAMIS	13	FOXHOLES		460
042	03	GLAMIS	34	HEARTH W/CANS	N.A.	515
043	01	GLAMIS	16	POT SHERD	5.00	532
044	01	GLAMIS	07	POT SHERD SCATTER		560
045	01	GLAMIS	13	MILITARY CAMP		380
046	01	GLAMIS	34	TRAIL (ABORIGINAL?/ORV?)	N.A.	385
046	02	GLAMIS	34	TELEGRAPH POLES		390
047	05	GLAMIS	34	HEARTH W/CANS		400
047	03	GLAMIS	13	FOXHOLE		400
047	02	GLAMIS	34	HEARTH	N.A.	380
047	06	GLAMIS	16	CHALCEDONY TOOL (POSSIBLE)		400
047	01	GLAMIS	34	NICKLE 1940	N.R.	405
047	04	GLAMIS	13	ARMY EMPLACEMENT		435
048	01	GLAMIS	34	HEARTH	<10	410
048	02	GLAMIS	34	ROCK ALIGNMENT		420
048	04	GLAMIS	34	CHARCOAL HEARTH		420
048	05	GLAMIS	13	MILITARY CAMP		

ATTACHMENT 5
SITE LISTING BY TYPE
(continued)

TRANSECT #	SITE #	ZONE	SITE TYPE	DESCRIPTION	SIZE	ELEVATION
048	03	GLAMIS	34	CHARCOAL HEARTH		420
050	01	GLAMIS	34	SCATTERED CHARCOAL		485
050	02	GLAMIS	34	HEARTH W/CANS		500
051	03	GLAMIS	13	MILITARY CAMP		523
051	06	GLAMIS	13	FOXHOLES (5)	8.75	510
051	05	GLAMIS	13	SLEEPING SQUARES		500
051	04	GLAMIS	34	CAMPFIRE		518
051	07	GLAMIS	13	HEARTH W/CANS		505
051	01	GLAMIS	13	HEARTHS (2) W/CANS		540
051	02	GLAMIS	34	CHARCOAL HEARTH	1	525
054	04	GLAMIS	13	MILITARY CAMP (PROBABLE)		410
054	02	GLAMIS	34	AXE CUT IRONWOOD TREE		410
054	06	GLAMIS	34	CHARCOAL HEARTH		420
054	01	GLAMIS	16	CHERT TOOL (POSSIBLE)	N.A.	410
054	03	GLAMIS	34	HEARTH W/CANS		435
054	05	GLAMIS	34	AXE CUT IRONWOOD TREE		420
056	01	GLAMIS	31	CAN DUMP		420
057	06	GLAMIS	16	CHERT FLAKE	N.A.	500
057	04	GLAMIS	34	CHARCOAL HEARTH		530
057	03	GLAMIS	13	CHARCOAL HEARTH W/METAL		530
057	02	GLAMIS	13	HEARTH FOXHOLE		560
057	05	GLAMIS	13	CAMPING ACTIVITY		500
057	01	GLAMIS	13	HEARTH FOXHOLE		500
058	01	GLAMIS	34	CHARCOAL HEARTH		360
060	01	GLAMIS	02	HAWLETT@ 1939		390
061	06	GLAMIS	13	SLEEPING AREA		430
061	03	GLAMIS	16	CHERT FLAKE	N.A.	455
061	01	GLAMIS	34	DEPRESSION		425
061	02	GLAMIS	34	CHARCOAL HEARTH		455
061	04	GLAMIS	16	CHERT FLAKE	N.A.	455
061	05	GLAMIS	13	FOXHOLE		450
062	01	GLAMIS	18	CIRCULAR AREAS (3)	24.00	N.R.
062	03	GLAMIS	34	SIGN (ARROW SHAPED)		480
062	02	GLAMIS	02	SLEEPING CIRCLE W/SHERD SCAT	175.00	470
064	01	GLAMIS	16	POT SHERD	N.A.	460
065	01	GLAMIS	34	METAL SHOVEL BLADE		420
066	01	GLAMIS	07	POT SHERD SCATTER	4.00	431
066	04	GLAMIS	34	CHARCOAL HEARTH		415
066	05	GLAMIS	16	JASPER MULTI-USE TOOL	N.A.	415
066	03	GLAMIS	34	CHARCOAL HEARTH		465
066	02	GLAMIS	34	CHARCOAL HEARTH		470
067	01	GLAMIS	26	WAGON TRACKS (POSSIBLE)		450
075	01	DUNES	07	POT SHERD SCATTER	1.00	130
075	02	DUNES	16	FOSSIL BONE	N.A.	N.R.
076	01	DUNES	07	POT SHERD SCATTER	1.00	N.R.
077	01	DUNES	07	POT SHERDS	1.00	120
078	01	DUNES	16	QUARTZITE FLAKE	N.A.	123
082	01	DUNES	07	POT SHERD LOCUS W/CHERT FLAKE	1800.00	125
083	01	DUNES	02	POT SHERDS (2) FLAKES (3)	144.00	N.R.
084	01	DUNES	16	HAMMERSTONE	N.A.	125
086	01	DUNES	02	CAMPSITE (ABORIGINAL)	9000.00	133
086	02	DUNES	07	POT SHERD SCATTER	100.00	N.R.
089	01	DUNES	16	CHERT FLAKE	N.A.	130
089	02	DUNES	16	POT SHERD	12	132

ATTACHMENT 5
SITE LISTING BY TYPE
(continued)

TRANSECT #	SITE #	ZONE	SITE-TYPE	DESCRIPTION	SIZE	ELEVATION
090	01	DUNES	07	POT SHERD SCATTER	4.00	133
091	03	DUNES	16	POT SHERD (1) FLAKE (1)	N.A.	150
091	02	DUNES	07	POT SHERD SCATTER	8.00	N.R.
091	01	DUNES	07	POT SHERD SCATTER	N.R.	N.R.
093	01	DUNES	02	POT SHERDS (2) FLAKES (2)	N.R.	N.R.
093	02	DUNES	16	HAMMERSTONE (POSSIBLE)	N.A.	135
094	01	DUNES	16	POT SHERD	N.A.	137
095	04	DUNES	02	POT SHERDS(3) CHERT CORE(POSS.)	N.R.	150
095	02	DUNES	07	POT SHERD SCATTER	N.R.	150
095	03	DUNES	16	CHERT FLAKE	N.A.	145
095	01	DUNES	02	FOSSIL BONE, LITHICS, BONE	29.00	150
098	01	DUNES	16	HAMMERSTONE	N.A.	135
098	02	DUNES	16	POT SHERD	N.A.	135
098	04	DUNES	05	FLAKES, HAMMERSTONE (POSSIBLE)	25.00	135
098	03	DUNES	07	POT SHERD SCATTER	81.00	135
100	01	DUNES	07	POT SHERD SCATTER	14.00	140
101	01	DUNES	16	LARGE MAMMAL BONE	N.A.	150
101	02	DUNES	16	COBBLE CONCENTRATION	N.A.	150
102	01	DUNES	16	CHERT CORE TOOL	N.A.	145
103	02	DUNES	16	POT SHERD AND STONE CHOPPER	N.A.	147
103	01	DUNES	07	POT SHERDS COBBLE CORE	490.00	145

ATTACHMENT 6

PORK JERKEY SITE CRESCENTIC

KANE SPRINGS AREA, IMPERIAL COUNTY CALIFORNIA

BY

Russell L. Kaldenberg
DISTRICT ARCHAEOLOGIST

July 10, 1979

Eccentric Crescentic

Located : June 1979

Discovered By: Laverne Conway, Glamis Crew Chief

Location : T.12S., R.11E., east of Highway 86 at BM 96, Kane Springs NE 7.5' Quadrangle

Material : Red Jasper

Probable Source of Material: Signal Mountain or Obsidian Buttes, Imperial County, California.

Condition of Artifact: Good, some evidence of Sand Blasting

Retouch: Percussion on ventral surfaces. Probable pressure on ventral side of left protrusion. Retouch more noticeable on ventral than dorsal surface.

Temporal Placement: 6000-9000 B.P. (Jertberg: 1978)

Weight: 19.4 grams

Dimensions

Maximum width	6.7 cm
Maximum "U" notch	1.025 cm
Maximum height of right leg	1.6 cm
Maximum height of left leg	1.45 cm
Maximum height at mid "U" notch	1.8 cm
Maximum width of left spur	.825 cm
Maximum length of left spur	.70 cm
Maximum width of right spur	1.3 cm
Maximum length of right spur	.50 cm
Maximum depth of "U" notch	.70 cm
Height from distal edge of tool to edge of right leg	3.25 cm
Height from distal edge of tool to edge of left leg	3.3 cm
Inside notch measurement of left spur	.30 cm
Maximum dorsal thickness (crescentic)	.95 cm
Maximum dorsal thickness of left leg	.85 cm
Maximum dorsal thickness of right leg	.90 cm
Maximum dorsal thickness of left spur	.35 cm
Maximum dorsal thickness of right spur	.55 cm

Width from outer left to outer right leg 4.98 cm

Maximum width from distal edge to center of "U" notch 3.5 cm

Maximum distance (diagonal) from outer right spur to proximal outside left leg 6.0 cm

Maximum distance (diagonal) from outer left spur to right outside proximal of right leg 6.2 cm

Retouch - distance between retouch on ventral side of left leg
Maximum 1.15 cm
Minimum .88 cm

Retouch distance from ventral of left leg to distal retouch edge
Maximum 2.65 cm
Minimum 0 cm

Retouch distance from ventral right spur to left proximal spur 6.3 cm

Minimum Retouch distance ventral right leg .70 cm
Maximum Retouch distance ventral right leg .90 cm

Maximum Retouch distance from distal edge to "U" notch (ventral side) 1.0 cm

Maximum Retouch interior "U" notch .70 cm

Maximum Retouch dorsal side of "U" notch .75 cm

Retouch thickness on distal edge of crescentic .22 cm

Maximum width of distal retouch .1125 cm

All measurements by a Scala Alinox 210 Caliper

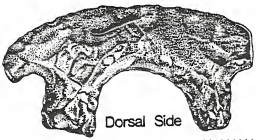
Descriptive terminology follows that established by Patricia Marie Jertberg IN

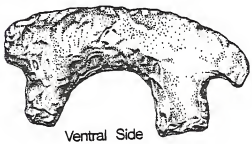
"A Qualitative and Quantitiative Analysis of Relationships of the Eccentric Crescent and its Value as an Indicator of Culture Change" 1978 MA Thesis presented to Cal State Fullerton.

All Measurements By: Russell L. Kaldenberg

Russell L. Kaldenberg
10 July 1979

ECCENTRIC CRESCENTIC
from Kane Spring NE Quadrangle
Imperial County, Ca. 1979





ATTACHMENT 7

SUPPLEMENT TO GLAMIS ARCHAEOLOGICAL PROJECT FIELD DATA

OR

WHY THIS PROJECT IS LIKE A CHUNK OF OLD SWISS CHEESE

OR

OUR FINAL COMPLAINT

BY
Laverne Conway, Glenda Foster, and Maureen Steiner

SUPPLEMENT TO GLAMIS ARCHAEOLOGICAL PROJECT FIELD DATA

The undersigned members of the Glamis Archaeological Survey crew have found it necessary to include this brief statement of problems relating to the work undertaken from April 8 to July 16, 1979. It is our concern that the field work and the data gathered should not be considered definitive, but should be viewed in light of the following statements.

This project was commenced and ended without a written research design. Field procedures and/or standards were undelineated (other than walking straight lines at intervals of 50-65 meters between persons for one mile by a quarter of a mile transects) and methodology was not satisfactorily defined. The field methods for the first two-thirds of the project were inconsistent at best. This contributed to the improper treatment of some of the cultural remains. There are still unrecorded sites within some of the transects walked and many incomplete site and transect records.

The attitude of the crew chief was such that we did not have field maps, transect or site records, and we were seldom consulted about the data in our field notebooks. A meeting was called on May 14, 1979 with Russell Kaldenberg, Project Quality Control Officer; Gail Egolf, El Centro Area Archaeologist; Marvis Kelley, Crew Chief; Glenda Foster, Maureen Steiner, and Laverne Conway, crew members, to discuss the inadequacies plaguing the project. After this meeting, we were allowed to fill out portions of transect and site forms in the field. It has recently been discovered that several of our completed forms have been altered or destroyed by Mr. Kelley. In fact, some of these falsifications occurred on forms that represent surveys in which Mr. Kelley did not even participate.

To complicate the situation further, the original schedule, with one month planned for write-up and consolidation of data, has been cut by at least three weeks. Mr. Kelley was terminated on or about June 15, 1979. We spent the time between June 15th and July 7th finishing the field work in the Glamis and Dunes/Canal areas. From July 8th to July 16th, the ordering and com-

pletion of written data has been attempted. This is clearly an inadequate amount of time to get the data into a professionally presentable form. In addition, it was impossible to finish the paper and field work for the San Felipe Wash area.

We regret that the quality of the project falls short of our professional standards and goals, and that as a consequence, the proper management of the inventoried cultural resources may be jepardized.

July 16, 1979

Maureen Steiner

Laverne Conway

Glenda Foster